

Introduction

Water Management in the Premodern Middle East: Forces from “Above” and “Below”

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[A town] should be on a river,
or springs with plenty of fresh water should be facing it.
The existence of water near the place
simplifies the water problem for the inhabitants,
which is urgent ...¹
Ibn Khaldūn, *Muqaddima*

When planning a city, the presence of water is crucial, says the historian Ibn Khaldūn (d. 808/1406). Unfortunately, he continues, the Arabs have not always taken his good advice into account. Ibn Khaldūn laments that “they [the Arabs] only see to it that they have pastures for their camels and they do not care whether the water is good or bad ...”² As a result, cities such as Basra “fell prey to ruin and disintegration.”³ Managing access to fresh water for large numbers of people, whether city dwellers or pilgrims and travellers, was without doubt one of the greatest challenges the Middle East and North Africa faced then, and still faces today. Nevertheless, in the premodern era, societies in the region were rather successful in providing water to highly populated cities such as Abbasid Baghdad and Mamluk Cairo, and along vital and busy roads such as the pilgrimage roads across the Arabian desert to the holy cities in the Hijaz. We still do not fully understand how this was achieved. Who was responsible, who financed, and who built water installations? Who were the people involved in the management and maintenance: Authorities, collectives, neighbourhood communities, elites, or private individuals? And for whom were the installations built: For households, broader communities or also for the common good?

¹ Ibn Khaldūn, *al-Muqaddima*, 2:184; Transl. Rosenthal, 2:246.

² Ibn Khaldūn, *al-Muqaddima*, 2:203; Transl. Rosenthal, 2:269.

³ Ibn Khaldūn, *al-Muqaddima*, 2:204; Transl. Rosenthal, 2:270.

This volume brings together research on the theme of water and management covering a broad geographical and chronological scope, from Roman Egypt and Damascus and Medina in the first centuries of Islam to Baghdad under the Buyids and Seljuqs and Cairo under the Mamluks. Each chapter focuses on the management of fresh water and asks questions on the (sometimes fraught) relationships between forces from “above”—central authorities, formal institutions and elites—and “below”—more traditional and informal practices and arrangements organised and carried out by and within local communities. At the same time, we take into account diverse landscapes and their related sources of water, that in turn ask for diverse infrastructure for collecting, transporting, storage and distribution. We can broadly divide water infrastructure into sources (rivers, wells, rainwater); collection (e.g., the roof of a building);⁴ storage (cisterns,⁵ ponds, ceramic jars); transport (canals, pipes, waterskins); and provision at the end point (drinking fountains, water shops,⁶ bathhouses and ablution facilities for washing). Furthermore, the provision of water implied safeguarding it: in particular by segregating clean water from wastewater and other sources of contamination through the creation and management of sewers, cesspits, and storage and disposal solutions for grey water and the assorted waste products that the pre-modern city generated.⁷ In practice many of these aspects often overlapped: Thus, a canal that was designed to transport water to a specific place would also provide water for the communities along the way who helped themselves, as well as providing for the transport of other goods on boats.⁸

The volume as a whole is the result of a conference held in Cairo at the Netherlands-Flemish Institute in February 2024 and forms, together with the forthcoming monograph (Maaïke van Berkel, *Urban Water Management in the Medieval Islamic World*, Bloomsbury), the culmination of the “Source of Life” project—an NWO (Dutch Research Council) VICI project at Radboud University in Nijmegen, the Netherlands (2019-2026). It brings together archaeologists and historians who explore a wide range of textual and material sources of evidence which relate to a multitude of institutions involved in the transport, storage and distribution of water. Together they explore the intersection between institutions and the physical reality of water use within cities (and their hinterlands) in the Mediterranean and the Middle East.

⁴ For example, the rainwater-collection network of the Amman Citadel, as the arid climate and its distance from stable sources of water made it particularly reliant on rainwater. As the archaeologist Ignacio Arce notes at information panels in situ: “Not a drop was misused or lost.”

⁵ See the contribution of Bethany Walker in this volume.

⁶ See Ibn al-Ukhuwwa’s instructions for a city’s market inspector (*muhtasib*) to regulate water shops, Ibn al-Ukhuwwa, *Ma’ālim al-qurba*, 97.

⁷ Insufficient attention has been paid to waste, sanitation and sewage in the MENA region with the exception of the *Médiévales* special issue “Lieux d’hygiène,” among which Reklaityte, “Les latrines en al-Andalus.”

⁸ Van den Bent, “Caliphal Involvement,” 14. See also the case of the rights-holders along the channel that supplied the Damascus mosque, mentioned in Hayes “Land, Law and Water Politics.”

Water History

Since the mid-20th century, scholarship on the relation between water and power or administration has often built on Wittfogel's thesis of hydraulic societies.⁹ Building on Weberian notions of a clear West-East divide and Weber's characterization of the Eastern (or sultan's) rule as despotic, Wittfogel argued that organizing water, especially in arid and semi-arid regions, required central bureaucratic and despotic rule. This prompted the emergence of the centralized state in, among others, ancient Egypt and ancient Mesopotamia, and in subsequent centuries under the Islamic rulers of the region. In his *Oriental Despotism* he emphasised the state's control of natural resources, including water, and the top-down involvement of authorities in the construction and maintenance of major water works. More recent studies have successfully refuted this overarching claim on the management of water and state formation, emphasizing the more egalitarian, society-based and bottom-up forms of organisation they encountered in their specific case studies.¹⁰ Nevertheless, Wittfogel's thesis is still persistent and continues to appear in scholarly debates. It is only very recently that water historians have tried to formulate alternative pathways for analysing the relation between state formation and water management, informed by historical and archaeological research worldwide.¹¹

In line with recent scholarship this volume moves beyond a top-down view on the relation between water and power. Instead, it focuses on the full range of institutions and stakeholders which played a role in the collection, transport, storage and distribution of water. As such it builds on insights from studies in political anthropology on the blurring of state and society and it tries to include all forms of agency. Scholarship in this field has reconceptualized non-Western states by avoiding a narrow interpretation of the state as main provisioner of basic (public) services and focused instead on the interplay of state and community-based mechanisms in the organisation of services, including the provision of water.¹² A good example of such an approach is Tessa Farmer's book on everyday water practices in present-day Cairo. It demonstrates the variety of interpersonal relationships which the residents of an informal neighbourhood obtain and maintain—both within the

⁹ Wittfogel, *Oriental Despotism*.

¹⁰ See, for example, Harrower, *Water Histories*; Wilkinson *et al.*, "Hydraulic Landscapes;" Wilkinson *et al.*, *Models of Mesopotamian Landscapes*.

¹¹ For example by Harrower, *Water Histories*.

¹² For political anthropological studies on state and society, see Gupta, "Blurred Boundaries;" Van Klinken and Barker, *State of Authority*; Migdal, *State in Society*. See also: Bayat, *Life as Politics*; Chatterjee, *Politics of the Governed*; Ismail, *Political Life in Cairo's New Quarters*; Simone, *City Life from Jakarta to Dakar*. For a water management focused study which does exactly this, see Farmer, *Well Connected*.

community and with authorities—to collaboratively organize clean water and wastewater infrastructure for their community.¹³

The water history of the medieval MENA region is still in its infancy and has so far mostly dealt with miscellaneous topics based on specific case studies. For example, archaeologists and architectural historians have often focused on the natural landscape, various types of water systems, knowledge of hydraulic technology and the ways in which water infrastructure was used. Especially fruitful for our understanding of water management have been studies that combined material and textual evidence. Good examples of such scholarship are the studies on Samarra by Alastair Northedge, Derek Kennett, and Peter J. Brown, on the water infrastructure along the Pilgrimage road from Iraq to Mecca, the *Darb Zubayda*, by Saad Al-Rashid, on early Islamic Egyptian Tinnīs by Alison Gascoigne, on Yemen by Ingrid Hehmeyer, on (mainly rural) sites in the Levant by Bethany Walker, and on Iraqi waterways by Peter Verkinderen.¹⁴ In addition, art historians have analysed the use and diverse functions of water in court life, for example its presence in the lush gardens and palaces of al-Andalus.¹⁵ Recently, some illuminating histories of some of the main rivers of the region have appeared, such as John Cooper's analysis of the navigational landscape of the medieval Nile,¹⁶ Peter Verkinderen's study of the waterways of Iraq and Iran in the early Islamic era based on both satellite imagery and Arabic historical and geographical sources,¹⁷ and, for a slightly later period, Faisal Husain's *Rivers of the Sultan* on the Tigris and Euphrates in the Ottoman era.¹⁸ Historians working with *fiqh* and hadith texts have written on topics such as water rights, hygiene and moral obligations of rulers with regard to water management.¹⁹ Then there are scholars interested in the history of science who dealt with knowledge transfer and the technicalities of water infrastructure.²⁰ Finally, some studies focused on water management in

¹³ Farmer, *Well Connected*.

¹⁴ See, for example, Northedge, *Historical Topography*; Northedge and Kennet, *Archaeological Atlas*; Brown, "Water in an Abbasid City;" Brown and Van Berkel, "Water Provision in Early Islamic Cities;" Van den Bent and Brown, "Constructing Hydraulic Infrastructure;" Al-Rashid, *Darb Zubaydah*; Gascoigne, "Water Supply of Tinnīs;" Hehmeyer, *History of Water Engineering*; Walker, "Liquid Landscapes;" Verkinderen, *Waterways*. On hydraulic techniques see also Zaqqouq, "Les norias;" Wilson, "Classical Water Technology."

¹⁵ See, for example, Blessing, "Vessel as Garden;" Ruggles, *Islamic Gardens*.

¹⁶ Cooper, *Medieval Nile*.

¹⁷ Verkinderen, *Waterways*.

¹⁸ Husain, *Rivers of the Sultan*.

¹⁹ See, for example, Van Berkel and Hayes, "Governing Water;" Salameh, "Customary Water Rights;" Wilkinson, "Muslim Land and Water Law."

²⁰ See, for example, Ruggles, *Islamicate Environments*; Hill, *A History of Engineering*; de Miranda, *Water Architecture*; Wilkinson and Rayne, "Hydraulic Systems in the Middle East;" Wilson, "Classical Water Technology;" Zaqqouq, "Les norias."

the countryside, exploring irrigation practices and regulations. Good examples of such studies are Yossef Rapoport's and Ido Shahar's analysis of rural society of the medieval Fayyūm, based on the 7th/13th-century account of these villages by al-Nābulṣī, and Ingrid Hehmeyer's *History of Water Management in Yemen*.²¹ In addition, the "Source of Life" project focused more on urban water management, profiting from work by, among others, Amalia Levanoni who analysed aspects of water provision in Mamluk Cairo and Yehoshua Frenkel who explored the same for the city of Damascus under Mamluk rule.²²

Such studies on specific cases are crucial to our understanding of water history. Indeed, Alan Mikhail has emphasised the gaping hole the MENA region forms in the global history of the environment in general and how global, large-scale, studies need to be fed by analysis of sources on regional situations.²³ This volume aims to contribute to the environmental history of the region by focusing on water history. It roots these detailed individual water studies in local experiences within a region-wide comparative perspective. A detailed region-wide comparative perspective on water management helps us to understand differences and similarities with regard to the environment and the local adaptations to it. Thus, this volume brings together studies dealing with related questions as to how local communities in the MENA region throughout the premodern period lived with their (changing) natural environments and adjusted these environments to access and wield one of its most crucial natural resources.

To date, we have a limited understanding of the actors involved and how communities at large managed to deal with the crucial task of water provision under challenging climatological circumstances. The environmental approach of the "Source of Life" project and the chapters of this volume not only illuminate the management of water, but also function as a microcosm for understanding broader processes and evolutions of urban governance. By studying the way in which societies dealt with a vital commodity such as water, and the challenges caused by organizing access to it and protection from it, we are able to refine our understanding of the ways in which societies were organized in a more general sense and which institutions and actors were involved in its administration. Although the project and the focus of this volume have been dedicated to urban governance, the environmental lens has encouraged us to look at urban administration beyond the

²¹ Rapoport and Shahar, "Irrigation in the Medieval Islamic Fayyūm;" Hehmeyer, *History of Water Engineering*. See also Haug, *Garden of Egypt*.

²² Levanoni, "Urban Water Management;" Frenkel, "Management of Water in Fourteenth-Century Damascus."

²³ Mikhail, *Water on Sand*, 1-25. For another recent region-wide comparative publication in the field of environmental history, see Ruggles, *Islamicate Environments*.

borders of the better documented cities alone, and to analyse its management in close relation to the diverse landscapes and ecosystems of its hinterlands.

The importance of the local becomes evident when we take a closer look at the case studies presented in this volume. The Middle East is home to tremendously diverse climates and landscapes, from the forests of Anatolia to the arid deserts of the Arabian Peninsula. Some of its areas are traversed by major rivers like the Nile, the Euphrates and the Tigris, which facilitated both water supply and transport, but also caused risk of flooding. Other areas lacked perennial water sources and completely depended upon (limited) rainfall. The case studies in this volume demonstrate administrative diversity in the light of ecological differentiation as well as changes throughout the centuries. The water situation in Cairo, for example, was highly dependent on the specifics of the river Nile, with its rise in summer, its movement westward in the Mamluk era, and its fluctuating volume per year (see Isoldi's and Bakhoun's chapters). On the other hand, the small-scale management of household hydraulic systems in rural and urban Mamluk and Ottoman Bilād al-Shām, where communities lacked perennial water sources and had to collect and store rainwater, form a different, locally specific, way of dealing with water, which also changed across time (see Walker's chapter). The similarly arid area in and around Arabia's Medina furnishes us with yet other divergent examples: In the early Islamic era landowners of local estates invested in complex and large-scale systems such as dams, wells and irrigation canals, and even used the control of water as a means to oppose the highest authorities, the Umayyad caliphs (see Munt's chapter). The Abbasid investments in the Darb Zubayda, in turn, were not only dependent on specific geographical circumstances of the arid climate, but also related to specific seasonable differences (see Brown's chapter). In Baghdad, the Tigris and Euphrates, and the many man-made canals fed by those rivers—some of which connected the Euphrates with the Tigris—formed the main source of fresh water (see Van den Bent's and Van Renterghem's chapters).

Methodology and Sources

The chapters in this volume use a wide range of sources of evidence to explore diverse, sometimes competing, perspectives on water management. With the exception of some technical (e.g., al-Karajī's *Inbāʿ al-miyāh al-khafiyya* (The Extraction of Hidden Waters) and legal treatises (e.g., the Egyptian *Qānūn al-riyy*),²⁴ few contemporary texts are truly dedicated to water provision or the management thereof. However, given the importance of water as a life necessity and its omnipresence,

²⁴ On the *Qānūn al-riyy*, see Borsch and Sabraa, "Qānūn al-Riyy."

the topic rears its head in a wide variety of sources, albeit in some cases more systematically than in others. Within the broad category of textual sources, there are a great many different source types in which references to water management are found, each with their own focuses, benefits, and challenges. Examples range from documentary sources such as *waqfiyyas* (endowment charters of charities) or court records to instruction manuals, from chronicles to geographies, and from legal texts to ethnographic material. A wide range of archaeological sources also play a key role in researching water management in the premodern Middle East. They include, for instance, surviving structures, excavations of monumental hydraulic infrastructure such as aqueducts but also of private homes, as well as aerial photography and satellite imagery. This volume as a whole and several chapters within it scrupulously incorporate and combine textual and archaeological sources and methods because of their complementary character.

First, general textual analysis allows for the identification of various aspects of qualitative information on water management, while archaeological research offers further insight in more practical and quantitative respects. Qualitative information includes the cultural and legal structures that underlie water management as well as its various stakeholders, and the interplay between them. *Waqfiyyas*, for instance, may describe water provision to endowed buildings as well as the water's beneficiaries (see Isoldi's and Bakhoun's chapters). Administrative records mention the installation of and repairs to drains (see Milwright's chapter). And chronicles and geographies describe construction activity of major projects and the main actors within these projects, but can also reveal day-to-day tensions related to these hydraulic installations (see Van Renterghem's and Munt's chapters).

Texts, however, are sometimes silent on a number of other important aspects of water management. Archaeological sources provide insight into the material and technological design (see Brown's chapter), the geographic distribution and chronologies of water systems and water sources, on the building, maintenance and restoration of the installations, and on dealing with wastewater, grey water, drains, sewers, cesspits, and sumps. Where possible, therefore, combining textual and archaeological sources provides a clearer picture. For instance, Bethany Walker (chapter 9) combines textual records on the spread, use and filling systems of cisterns in Mamluk and Ottoman Jordan and Palestine—demonstrating their financial and cultural importance—with archaeological excavations of cisterns in Tall Ḥisbān and Khirbet Beit Mazmīl. The chapter shows how these cisterns were used, abandoned, restored, and reused over the course of centuries.

Second, cultural norms on water management are often more easily derived from textual sources (although certainly not absent in archaeological remains), while archaeological data at times can add details on the realities of everyday life. Sources such as legislation, tax-, or *ḥisba* manuals (advice treatises for the *muḥtasib*,

the market inspector) discuss water in various ways. Islamic legal texts give instructions on hygiene and purity, but also on (equal) water distribution; *kharāj* (land-tax) manuals are very concerned with various aspects of irrigation and access to water; and some *hisba* manuals contain instructions ranging from the upkeep of water infrastructure to bathhouse hygiene and regulations for water carriers. A challenge in using these sources, however, is that they are inherently prescriptive and normative. They voice what religious authorities, government officials, or others saw as desirable, as ideal. Their information can consequently not be translated directly to an understanding of actual practice. Despite risking a fine of €120, approximately a quarter of Amsterdam cyclists ignores a red light on a regular basis. Medieval inhabitants of the Mediterranean and the Middle East are unlikely to have been a lot more norm- and/or law abiding: despite repeated injunctions against drains emptying into the street, many an innocent passer-by fell victim to a sudden onslaught of drain water, and in Rome illegal tapping of aqueduct water was a recurring issue even though it was a fineable offense (see De Haan's chapter). Consequently, these texts reveal a lot about these norms and laws, as well as about motivations behind them and what various types of authorities considered important.

The same applies to more descriptive texts—such as histories, geographies or biographies—albeit perhaps to a lesser extent. While on the one hand they offer glimpses into everyday life, these too may contain material that describes norms more than practices. They may give actual historical examples of good and bad governance, but may also emphasise anecdotes that drive home ideals rather than reflect actual events, or idealise “the good old days” in favour of a murky present. Descriptions of Baghdad, for instance, on closer scrutiny are often descriptions of an (idealised) view of the Abbasid capital as it was newly built by al-Manṣūr (r. 136–58/754–75) rather than the situation at the time of writing. Yet, while it is sometimes difficult to evaluate to what extent propagated norms were adhered to, fact is that the sources voicing these norms were driven by practice and daily experiences and in turn affected practices and experiences, influencing the ways in which people shaped their environment and habits (see Hayes' chapter).

Written norms will emphasise, for instance, the importance of proper wastewater management and the reasons why, but may not necessarily explain in detail how that is done. Archaeology at times gives more information about daily practices and overall practicalities of water management that may not be as visible in texts, such as the ways in which wastewater drains were connected and cesspools easily accessible for cleaning, or the ways in which aqueducts were designed to be easily repaired.²⁵ For some areas under study in this volume, archaeological material is the most important primary source material offering all sorts of insights

²⁵ Scanlon, “Preliminary Report,” 16–18.

about daily practice, while for others it supplies relevant supporting evidence. This is not always possible, however. Precious little archaeological evidence for water management in early Islamic Medina has survived, for instance. Yet even then, remains discovered elsewhere can be used to compare and elucidate literary descriptions (see Munt's chapter).²⁶

Archaeological sources are especially helpful to uncover the daily practices of non-elites. While textual sources tend to have a primary focus on elites, archaeological sources can offer access to a broader social context. In terms of water management, this includes for instance water provision for individual households, or smaller-scale infrastructure constructed and maintained by local communities. Archaeological evidence has revealed that in Samarra, for which the textual sources report that drinking water came primarily from the Tigris,²⁷ areas with higher population densities were further away from the river. That meant it was harder for them to access water, and these areas may well have been lower-status neighbourhoods than the bigger plots close to the river.²⁸ In her contribution to this volume, De Haan (chapter 2) points out that smaller-scale, locally-maintained infrastructure was probably the dominant form of water management in many areas of the Roman Empire, although it rarely appears in the written sources, usually only in case of conflicts. Even so, written sources too can be important in deducing and analysing non-elite circumstances. De Haan also describes an ostrakon—at the intersection of archaeological and textual sources—from Egypt's Western Desert that reveals that high-ranking officials received three times as much water as the labourers who did the hard work, showing the struggles of the disadvantaged when it came to access to water. This information could not have been deduced from archaeological sources alone, as is the case for the key role played by water carriers in premodern Islamic cities, which again underlines the importance of combining various source types were possible.

Finally, archaeological and textual sources offer different temporal perspectives. Textual sources generally emphasise specific moments and events in history, offering key information on important moments and events and all their water-related consequences. Founding documents for instance reflect the (intended) situation at the time of a *waqf*'s establishment (see Isoldi's chapter), and chronicles recall weighty events, such as the foundation of a city and its water systems, or moments of crisis, such as dam breaks, riots, floods or extended droughts (see Van den Bent's, Van Renterghem's, and Munt's chapters). In some cases, this may mean

²⁶ See also, for instance, Northedge, *Historical Topography*; Van den Bent and Brown, "Constructing."

²⁷ al-Ya'qūbī, *Kitāb al-buldān*, 263.

²⁸ Brown, "Water in an Abbasid City," 16.

that the sources show us *ad hoc* solutions in times of crisis rather than a reflection of how maintenance and management was normally carried out. At the same time, “normalcy” is also frequently reflected in the narrative sources, especially when they relate anecdotes or events that are not actually concerned with water management, but in which matters or people related to water figure in the background. For instance, caliphal injunctions in a campaign against the praising of Mu‘āwiya ibn Abi Sufyān (r. 41–60/661–680) directed towards “the drinkers and water providers in the two Friday Mosques” alert us to their presence.²⁹ Archaeological sources, on the other hand, often provide testimony of the long-term developments, over centuries if not longer. That includes environmental aspects such as the changing courses of riverbeds and siltation, but also the human-made practicalities on how hydraulic infrastructure was built, maintained, and adapted. Walker’s contribution to this volume about cisterns, for instance, underlines the long history of household cisterns, which were built and (re)used over centuries and some of which show traces of being modified to address changing needs more than once.

The universality of the need for water—whether for drinking, bathing, washing, industry, or any other purpose—means that the topic often emerges in the textual sources and is eminently visible in all sorts of archaeological remains. By integrating various source types, and especially by combining textual and archaeological evidence, this volume gathers as many jigsaw pieces as possible in order to forge a clearer image of the region’s water history.

The Interplay of Tangible Infrastructures and Intangible Institutions

The current volume is primarily focused on cities, though it is acknowledged that when thinking about water provision, cities cannot be disconnected from their geological, ecological and political environments. When thinking about how an individual gets access to usable water in a given city at a given moment in time, we have to imagine a vast network of overlapping systems: human, non-human, tangible and intangible. The tangible infrastructure that provides water to its users is perhaps the most visible part of these systems: canals in the landscape, ditches in the archaeological record, wells and cisterns in surviving buildings and jars and ornamental fountains in museums, but such infrastructure requires social and political processes and institutions to ensure the provision of water at every step. The users *are* the system, not merely recipients of it.

Tangible infrastructures require constant human participation to create, maintain, and regulate them. Not only governments and elites, but people at all levels

²⁹ al-Ṭabarī, *Ta’rikh*, 3.4:2165.

of society were engaged in the effort to ensure that enough water reached them. While large infrastructures such as the great canals of Cairo or Baghdad required significant investment that only the richest of elites, often linked with the state, could provide, many crucial parts of the system were created and maintained by individuals, families, and communities further down the social scale. While little information is often accessible about such low-level local initiatives, our sources sometimes give us hints, as in Ibn 'Asākir's description of water infrastructure in Damascus. He notes that, in the Damascus of his day (6th/12th century):

There are various channels³⁰ with defined endowments which are under the supervision of the overseer of endowments (*mutawallī al-awqāf*), [and these] are well-known and clear. Most of them are not endowed but are managed by the Muslims [i.e. the local citizens] and benefit is obtained by all of them, and the wells are kept fresh by the neighbouring [people]. I will mention them and write down the number of them so that whoever wishes to count them may know them.³¹

The way people created and managed infrastructure was sometimes *ad hoc*, but given the importance of the task at hand, such arrangements often crystallised into customs and institutions (both formal and informal) and these were sometimes recorded and codified. We see water infrastructure managed through the decree of rulers and their representatives at all levels, the normative judgements of lawyers, and the practical oversight of judicial authorities,³² and the agreements and consent of specific user communities. Technical solutions to specific infrastructural needs (such as the creation of water-tight plaster for lining cisterns, or the casting of interlocking sections of ceramic pipes) were passed down by craftspeople embedded in particular social and economic contexts (see Milwright's chapter). Religious and cultural mores influenced both what kind of value was given to specific types of water provision (for example the provision of water for ritual ablution at mosques),³³ but also how tasks should be carried out, and by whom. Both the informal and the formal processes and institutions of managing water and its infrastructure could be highly regionalised, responding to local ecologies, economies,

³⁰ The Arabic word *qanāt* can have various meanings including aqueduct, underground conduit drawing water from the water table, and simple channel or canal.

³¹ Ibn 'Asākir, *Tārīkh Madīnat Dimashq*, 2:377–78. Ibn 'Asākir seems to imagine his readers walking round the city and counting them off as they walk. For an in-depth study of this chapter, see Hayes, "Land, Law and Water Politics."

³² See the arrangement for maintenance of drinking fountains in *waqf* documents studied by Isoldi in this volume. See also Isoldi, "Confluent Waters;" Van Berkel, "Waqf Documents."

³³ For a discussion of the hierarchy of purity of different types of water and their purposes, see Van Berkel and Hayes, "Governing Water."

and cultures, but were also transmissible between regions, as good ideas caught on and were carried around with migrants, merchants, scholars and rulers.³⁴

While the division of the world into public and private spheres of enterprise has justly been problematised in its applicability to pre-modern contexts,³⁵ it is important to acknowledge a spectrum of users and user communities from purely private initiatives (like constructing a cistern or a cesspit to serve one's own domestic use); to infrastructures beyond the domestic space like groups of families sharing a cistern; to provision aimed at far greater communities like the provision of water at a large mosque; or a *waqf*-funded dispensing of water from a *sabil* at particular times of day. Pre-modern Middle Eastern governments certainly did not come with the same expectations of provision of public services associated with modern states. Furthermore, our modern expectations of a divide between public and private duties must be adjusted to the blurring of public and private duties by the fact that major infrastructural works that benefitted the public could often be provided by actors from within the state elite acting as private individuals to gain thereby for themselves prestige, honour, and a reward in heaven. Successful governments therefore were associated with the provision of certain public amenities, without these amenities being provided directly by a state in a *de jure* sense. We do, it is true, occasionally see statements that suggest that providing clean water was one of the duties of ruler to ruled. But in general, the duties, theories and motivations for providing water in society were various: from the efforts of individuals and families to provide themselves with water, to a charitable gift from an elite person to the less advantaged, to the acts of rulers, to activities carried out within the framework of profit, such as the operation of a fee-paying bathhouse, or a water carrier paid to provision elite households, or an irrigation canal constructed as an investment by a landowner with the aim of increasing the value and productivity of the land. Such interlocking motivations gave different actors different scopes for intervening in the patchwork of structures and institutions, that, taken together, were able to sustain very large premodern cities in the Middle East.

³⁴ The history of underground *qanāts* is an interesting though controversial case study in the question of the diffusion of technology. For this, and the wider debate about the transmission of agricultural crops, techniques and technologies, see Kirchner *et al.*, "Re-Thinking the 'Green Revolution'." See also al-Ya'qūbī on hiring experts from different places for the construction of water infrastructure in Samarra. al-Ya'qūbī, *Kitāb al-buldān*, 264.

³⁵ See, Denoix, "Les notions de « privé » et de « public »."

Outline of the Book: Water across Time and Space

We have chosen to structure this volume according to region, while sticking loosely to chronology, which allows us to emphasise the experience of people, including local communities, elites and rulers, and the constraints and possibilities of the diverse environmental conditions in specific localities. The four sections of the book cover four of the main localities in the region at large.

To emphasise the *longue durée* history of water institutions and traditions in the broader Mediterranean, the volume starts with an overview chapter on water management in the Roman world, including examples from the MENA region in pre-Islamic times. Nathalie de Haan's "Water, Wealth and Inequality in the Roman World: Forces from 'Above' and 'Below'" explores the relationship between power and water distribution in urban and rural contexts and analyses the stakeholders involved in regulating access to water. It challenges the widespread misconception that large quantities of water were available for everyone in the Roman Empire thanks to Roman technological and organisational qualities. The available amount of water from the impressive Roman aqueducts, for example, was unevenly divided, and as such De Haan's chapter demonstrates much more continuity with post-Roman practices than is commonly assumed.

The first regional section is on the Hijaz during the early Islamic era, the Umayyad and early Abbasid reigns. Both contributions within this section, Harry Munt's "Water Management in Early Islamic Medina: Infrastructure, Labour and Politics" and Peter J. Brown's, "An Environmental History of the Darb Zubayda: Towards a First Approximation", take a clear environmental approach to water management. While Munt links environmental questions to issues of power, Brown focuses on the particular challenges caused by the changing seasons of the hajj. Munt analyses the precarity of water provision in Medina in the early Islamic era, but also emphasises that it was plentiful enough to sustain cultivation of the area if the water infrastructure was carefully maintained and managed. On the basis of (principally local) histories, Munt argues that the complex mechanisms for collecting, transporting, storing and accessing water offered opportunities for the ruling elite, the Umayyads, to expand their influence in the region. Local representatives and relatives of the Umayyads were instrumental in this process, to the disadvantage of other rival families. Peter J. Brown links caliphal investment in the pilgrimage routes, the Darb Zubayda, to favourable (during winter) and unfavourable (during hot and dry summers) hajj seasons. Combining archaeological and textual evidence with details on regular meteorological cycles and fluctuating climatic conditions, Brown argues that investments in the Darb Zubayda, including the establishment of waystations and water facilities, were not only motivated by political and socio-economic conditions but probably also by environmental

challenges. Especially during the years when the hajj took place in the hot summer months, the Abbasid caliphal family seems to have been more inclined to extensively invest in the water infrastructure along the pilgrimage roads to minimize the risks of water shortages.

The next chapter, “The Infrastructure of Purity: Plumbing Advice from Hadith and Early *Fiqh*”, by Edmund Hayes, bridges the geographical foci of the first and second sections, discussing hadith texts attributed to scholars located both in the Hijaz and Iraq. The texts analysed relate to very specific pieces of infrastructure (drains, sewage ditches, wells), and the cases provide a level of granular detail that suggest they might emerge from concrete lived experiences. However, in addition to the level of local detail, they also engage with a broader normative concern which ultimately made them relevant to pious readers across the Islamic empire: the motivation to maintain pure water that would be suitable both for drinking and ritual ablution, in urban environments packed with the peril of potential pollutants. The Iraqi context, and more specifically the Baghdadi context, takes centre stage in Josephine van den Bent’s chapter “Baghdad’s System of Water Provision: Infrastructure, Maintenance, and Decline in the City’s First Two Centuries”. Van den Bent focuses on the development of the system of water provision in Baghdad over the first two centuries of the city’s existence, paying special attention to the division of responsibilities in the maintenance of water infrastructure. She emphasises the multiple foundations of the city’s system of water provision and how this diversity allowed the city to endure, especially in times of crisis. Vanessa Van Renterghem’s chapter, “Fighting over Water: Everyday Water Issues in Late Buyid and Early Seljuq Baghdad (5th/11th Century)” moves chronologically to Baghdad in the 5th/11th century—a period in which the city was the stage for recurring crises of diverse character, all of which affected inhabitants’ access to water. The “forces from below” are particularly prominent in her chapter. By focusing on a number of case studies in which access to water caused conflict and tension, Van Renterghem not only analyses the role of rulers and their administration but also the influence of neighbourhood communities and individuals in the water provision of the population.

The third section is on the Levant and again moves on in time. It focuses on the physical evidence involved in the collection, storage and transportation of water. In his “Urban Crafts Associated with the Provision of Water in Islamic Syria”, Marcus Milwright uses archaeological and textual sources alongside ethnographic observations to analyse artisans’ practices in producing water-related infrastructure and its components. Ranging from the medieval period until the early 20th century, Milwright explores the socio-economic significance of these practices, as well as their continuity. Continuity and discontinuity of water infrastructure is also pivotal in Bethany Walker’s “Traditional Water Harvesting in Mamluk and Early Ottoman

Bilād al-Shām: The Family Cistern”. The local environment, especially the lack of perennial sources of water in large parts of Jordan and Palestine, urged local urban and rural communities to construct and maintain family and community cisterns. Basing herself on two case studies, Tall Ḥisbān in Jordan and Khirbet Beit Mazmīl in the hinterland of Jerusalem, Walker studies the long-term history of these water storage installations and analyses why these small-scale cisterns, which had hardly received any attention from the government throughout their existence, suddenly became of financial interest to the Mamluk and early Ottoman administrations. Similarly to Milwright, she combines textual and archaeological sources with ethnographic evidence.

The final section of this volume is on Egypt. In her chapter, “‘From a Spring Where Allah’s Servants Will Drink’: Reassessing the Social Significance of *Sabils* in Mamluk-Era Cairo”, Angela Isoldi argues that the water dispensers of the later medieval Cairene landscape, the *sabils*, were really not that important volume-wise in the provision of water for the city. Challenging the idea that *sabils* were crucial to urban water provision, Isoldi instead understands these facilities as part of a policy of undertaking charitable deeds on the part of the *ahl al-dawla*. Dina Ishak Bakhoun’s chapter, “Cairo’s *Sabils* during Egypt’s Modern Period”, then discusses the preservation and afterlife of these monuments from the 19th century onwards. Exploring the reason why these facilities lost their original function in the course of the modern era, she focuses on various stakeholders involved in their preservation and particularly on the role of the Comité de conservation des monuments de l’art arabe.

The book concludes with an epilogue by Alan Mikhail in which he reflects on the various chapters in this volume and how they contribute to broader questions of the environmental history of the region in the premodern era. Thanks to these case studies from different MENA regions, this volume demonstrates the wide range of practices and arrangements related to water management in the region during that era, the many ways in which these were influenced by local constraints and possibilities, and the involvement of a huge variety of players, both from “above” and “below”.

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