

Chapter 1

History of Water Management: Historical Perspectives and Technological Dynamics

Taoufik Ait Bouchgour

 <https://orcid.org/0000-0001-5633-020X>

*Faculty of Arts and Humanities Ain Chock, Hassan II University of Casablanca,
Morocco*

Khalid Lahyani

 <https://orcid.org/0000-0002-0035-1615>

ENSAM Casablanca, Hassan II University of Casablanca, Morocco

Ghizlane Moukhliiss

 <https://orcid.org/0000-0003-3699-2008>

ENS Casablanca, Hassan II University of Casablanca, Morocco

ABSTRACT

Since ancient times, water management has shaped human societies, their economies, political structures, and imaginations. This chapter traces the major stages of this history, from ancient hydraulic civilizations to contemporary policies, including medieval innovations and colonial transformations. Through a cross-disciplinary analysis, it highlights the diversity of techniques (khattaras, seguias, dams, desalination) and governance systems (community-based, piecemeal, technocratic). The case of Morocco, studied over a long period of time, illustrates the tensions between local heritage and modernization. The recent rise of digital technologies and artificial intelligence opens up new prospects for more sustainable, equitable, and resilient management. This work argues for a revaluation of historical knowledge in future water policies.

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INTRODUCTION

Water is at the heart of human history. As a vital resource, it determines the survival of societies, shapes their territorial settlements, and determines their economic and political models. Since antiquity, the ways communities obtained, used, and shared water have reflected not only their technical capacities but also their systems of power, belief, and governance. Studying the history of water management therefore means examining the forms taken by the relationship between humans, nature, and technology through both local and global dynamics (Delli Priscolli and Wolf 2009). More recently, several researchers have emphasized the need to re-examine this history in light of contemporary issues of sustainability and environmental justice (Loftus, 2018; Mehta et al., 2012).

From the earliest hydraulic civilizations of the Fertile Crescent—Mesopotamia, Egypt, and the Indus Valley—access to water has been a strategic issue. These societies developed sophisticated infrastructure: irrigation canals, dams, cisterns, and aqueducts. These devices were not mere technical instruments; they embodied a hierarchical social organization in which control over water was equivalent to the exercise of power. As early as 1957, sinologist Karl Wittfogel formulated his famous theory of hydraulic despotism, arguing that states such as those of imperial China had built their power on centralized control of water networks (Wittfogel 1957). However, this interpretation has been qualified by more recent approaches that emphasize the diversity of local trajectories and the importance of community institutions in water management (Barraqué, 2025; Boelens & Seemann, 2014).

In fact, hydraulic history cannot be reduced to a dichotomy between centralization and autonomy. In the Andes, *acequias* were co-managed by peasant assemblies; in Southeast Asia, Balinese *subak* networks are based on cooperative logic linked to temples. This research highlights the diversity of water management systems, calling for a move away from a linear model of modernization (Molle & Mollinga, 2003; Shah & Ballabh, 1997). Today, these studies resonate particularly strongly in contemporary debates on water governance and the resilience of local systems to climate change (Pahl-Wostl, 2020). This research highlights the diversity of historical trajectories, calling for a move away from a linear model of modernization.

The medieval Arab-Muslim world, particularly between the 8th and 14th centuries, is a particularly rich example of this complexity. Cities such as Fez, Cordoba, and Baghdad developed impressive water distribution infrastructures, combining scientific knowledge, hydraulic techniques, and religious norms. Techniques such as the *noria*, the Persian *qanat*, and the Maghreb *saguia* ensured precise irrigation in often arid environments. Al-Karaji, al-Razi, and Ibn al-Haytham, in their treatises, discussed the physical properties of water, collection systems, and the medical and urban uses of this resource (Nasr 2006; Hill 1994).

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