The water supply of Constantinople: archaeology and hydrogeology of an Early Medieval city

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Abstract This paper describes the longest ancient aqueduct system in the Mediterranean World, built in the 4th century A.D. to supply the city of Constantinople, then capital of the Byzantine Empire. Results are presented from ongoing investigations in the city and hinterland of modern Istanbul by an international team of archaeologists and hydrogeologists. The hydrogeological setting of the region resulted in the development of a unique water supply system, which survives both as archaeological remains and in the writings of contemporary historians.

Keywords Aqueduct · Constantinople · Karst · Water resources

Introduction

Constantinople, renowned and admired as a centre of Christian art and culture until the 15th century, was founded in A.D. 330 by the emperor Constantine on the natural boundary between Europe and Asia. The emperor extended the walls of the old city of Byzantium and within three decades the urban population had begun to expand significantly. Taking on the mantle of old Rome, the city became a focus for imperial patronage and display, acquiring within a century many of the grand urban structures expected of an eastern classical metropolis: the fora, baths, colonnaded streets and a hippodrome (Mango 1990; Ricci 1999). At a time when many western cities stagnated or shrunk in size, Constantinople expanded and flourished in both cultural and physical wealth.

Only fragmentary remains survive from the late antique and Byzantine city because much has been lost or lies buried beneath later Ottoman and Turkish Istanbul. Yet the fundamental necessities for urban existence in the early medieval world, religion, security and sustenance, are represented in three of the city’s greatest surviving monuments. The finest achievement of the 6th-century emperor Justinian, the church of Hagia Sophia, still dominates the Istanbul skyline and the western extent of the old city is marked by the Land Walls of Theodosius, commenced in A.D. 415. The third structure is the Bozdoğan Kemerı (Fig. 1), a great water bridge of around 86 arches spanning one of the city’s busiest highways and normally identified as the Aqueduct of Valens (Dalman and others 1933; Mango 1995). It remains the most conspicuous surviving element and engineering feat in a vast and complex system of water channels and aqueducts, which supplied the city with water from sources in Thrace, the region commonly defined as ‘European Turkey’ (Fig. 2). According to a contemporary source the 4th-century emperor Valens welcomed the Thracian nymphs and waters to the thirsty city, transported there by the new overground and underground river (Themistius, Orationes 13. 168a-b; Mango 1995, p. 13).

At over 250 km, it is the longest water supply line known from the ancient world and it remains one of the greatest achievements of hydraulic engineering. It has however been largely ignored in all standard accounts of Roman hydraulic engineering (see Hodge 1992). The principal reason for this is that for much of their length, the water channels run through dense and inhospitable forest, thereby effectively deterring archaeological investigations until recently.

More than 30 stone water bridges and many kilometres of underground tunnels carried the water over mountain and plain from the plentiful springs of the Istranja mountain range near Vize directly to the heart of the city (Mango 1995; Çeçen 1996a). Such was the magnificence of the undertaking that it even appears to have received its own popular mythology so that medieval writers claimed that its source was the great Danube River (Dirimtekin 1959). They were not far wrong. The known system is at least two...
In many respects the completion of this new water-supply system inaugurated and confirmed the city as the new capital of the Roman world, the New Rome. Not only was it built to fulfil the daily needs of the growing population, but it also supplied the great bathing establishments (thermae) and monumental fountains (nymphaea) expected in any classical metropolis (Crow and Ricci 1997). To the resident emperors, the water supply was not simply a