Phil. Trans. R. Soc. A (2010) 368, 5107–5110
doi:10.1098/rsta.2010.0216

PREFACE

Water and society: past, present and future

The minds of academics, politicians, industrialists and indeed everyone with an interest in either the health of the planet and its people or their own private pursuits have become concerned with water: far too much of it in some places—floods and tsunamis—and far too little of it in others. By 2025, almost one-fifth of the global population is likely to be living in countries or regions with absolute water scarcity while two-thirds of the population will most probably live under conditions of water stress (UN-Water 2007). Population growth, economic development and urbanization place unrelenting pressure on the planet’s water resources. Ongoing, human-induced, climatic change is likely to have a further detrimental impact on water supplies to large sectors of the global population: precipitation is forecast to decrease and evaporation to increase in precisely those areas that are already suffering from water stress (Parry et al. 2007; UNEP 2007); extreme rainfall events and hence the likelihood of floods are predicted to increase in frequency (Zhang et al. 2005; Alpert et al. 2008).

How we mitigate against and adapt to the changes in the water supply in the context of the seemingly endless increase in the demand for fresh water will play a key role in domestic and international politics for the next decade, just as it will do in how we manage our own day-to-day lives. It would be wrong, however, to think that this is anything new for human society: the management of water supply has been an issue for human communities ever since the appearance of the first, settled farming communities 10,000 years ago. While archaeologists have always had awareness of the role of water supply and its management in past communities (Clark 1944), the current water crisis and the potential future impact of climate change has inspired them to ask more penetrating questions about the relationship between water and past society (Scarborough 2003). It is to the advantage of those primarily concerned with the future that archaeologists, and the palaeoenvironmentalists with whom they closely collaborate, are doing so, because even if there are no direct lessons from the past our understanding of water and society requires a long-time depth perspective.

It was with a view towards gaining a comprehensive understanding of the relationship between water and society especially in the context of past and future climate change that led us to organize the joint Discussion Meeting between the Royal Society and the British Academy in November 2009 from which the papers in this Discussion Meeting Issue originate. The combination of these two bodies is critical because issues about water and society flow all the way from the ‘hardest’ of the sciences to the ‘softest’ of the humanities: we have as much need

One contribution of 14 to a Discussion Meeting Issue ‘Water and society: past, present and future’.
to understand atmospheric physics as we do the religious symbolism of water if we are going to manage our way through the looming global water crisis, and gain insights into past communities.

In this regard ‘water and society’ is an academic theme that has no disciplinary boundaries and has relevance to all regions of the planet and all times in the past, present and future. Discussion Meetings and the proceedings of the *Philosophical Transactions of the Royal Society A* have limits, however, and consequently this Issue is restricted in its scope and coverage. With regard to the disciplines represented, we have included meteorologists, archaeologists, hydrologists, geologists and human geographers, and are conscious that we are lacking representation from others, such as those concerned with the role of water in international relations. With regard to geographical coverage, we have restricted ourselves to the Middle East.

Both this geographical area and mix of disciplines were pre-selected for us because the Discussion Meeting arose out of a 5 year project (2005–2009) we had been involved with at the University of Reading and Council for British Research in the Levant entitled *Water, life and civilisation* (Mithen & Black in press), funded by the Leverhulme Trust. That project had aimed to assess the changes in the hydrological climate of the Middle East and North Africa (MENA) region and their impact on human communities between 20000 BP and AD 2100, with a case study of the Jordan Valley. Its key contributions had been to develop interdisciplinary approaches to understand water and society in past, present and future communities. To this end, one of the focuses of *Water, life and civilisation* was the evaluation of the climate and hydrological models being used to predict future changes in water supply by their capacity to predict what had actually occurred in the past.

While pursuing that research project, we were conscious of projects with similar aims and approaches being undertaken elsewhere. Most notably the GLOWA Jordan Rover Project based at the University of Tübingen and the Mediterranean Landscape Dynamics Project at the University of Arizona, along with closely related research by colleagues at universities in the Middle East, especially in Israel, and the Hadley Centre of the UK Met Office. It was, therefore, the aim of the joint Discussion Meeting between the Royal Society and the British Academy to bring contributions from these projects together as a means to compare methods and results; we also wanted to promote both the overall theme of water and society and the interdisciplinary approaches being adopted.

The resulting Issue has 14 contributions that range in their coverage from predictions of the latest global circulation models to the most recent archaeological discoveries about the origins of water management in the Neolithic. The Issue opens with an overview of the climate, hydrology and water management in Jordan and Israel today (Black 2010). The first research paper (Hemming *et al.* 2010) describes the uncertainties in climate projections for the Middle East, emphasizing the need to improve our understanding of how large-scale processes and teleconnections affect the region. Next Jin *et al.* (2010) present projections of changes in the water cycle in the eastern Mediterranean from a state-of-the-art high-resolution (20 km) global climate model. Wade *et al.* (2010) then describe the impact of these projected changes on the water resources of Jordan, using Wadi Faynan in southern Jordan and the River Jordan as examples. The next paper (Black *et al.* 2010) uses models and observations to show that

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the climate changes projected for the future have more in common with the long-term evolution of east Mediterranean climate through the Holocene than with historically observed variability. The global and regional processes that have shaped these Holocene changes in east Mediterranean precipitation are described in depth in the next paper—Brayshaw et al. (2010). Proxy observations are then used to show how the processes described in Brayshaw et al. (2010) and Black et al. (2010) have affected the climate of the southern Levant (Rambeau 2010). The papers on the climate of the past provide the context for Mithen (2010), who describes the pre-history of water management in the Jordan Valley. The final paper on the past (Barton et al. 2010) introduces novel methods of studying how humans interact with their environment, and specifically the interactions between Neolithic societies in Jordan and water. The last four papers in the Issue return to the present and future—focusing on water management and society in Jordan and Israel. Potter et al. (2010) describe the impact of water scarcity in Jordan, and the consequent water rationing, on households in Amman. Carr et al. (2010) use a multi-disciplinary approach to show how farmers manage scarce water resources by re-using waste water for irrigation. Tielbörger et al. (2010) emphasize the cultural importance of water, and the need to consider a wide range of ecosystem services when planning how to adapt to climate variability and change. The final paper of the Issue by Issar & Adar (2010), describes how exploitation of groundwater may mitigate current and future water crises in the Middle East.

The authors of each of the papers listed above describe the latest research in their own particular disciplinary area or how knowledge and expertise are being combined to build interdisciplinary approaches. We have attempted to ensure that there is a clear uninterrupted thread linking each of contributions, showing their relevance to each other and demonstrating the extent of the challenge we face to gain a comprehensive understanding of the relationships between water and society throughout history, in the present and into the future.

The Discussion Meeting on which this Issue is based was jointly hosted by the Royal Society and the British Academy. The Water, Life and Civilisation project, which provided the impetus for the Discussion Meeting and this Issue, was funded by the Leverhulme Trust.

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