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# **Sustainable Groundwater Development**

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HISCOCK, K. M., RIVETT, M. O. & DAVISON R. M. (eds) 2002. *Sustainable Groundwater Development*. Geological Society, London, Special Publications, **193**.

PRICE, M. 2002. Who needs sustainability? *In*: HISCOCK, K. M., RIVETT, M. O. & DAVISON, R. M. (eds) 2002. *Sustainable Groundwater Development*. Geological Society, London, Special Publications, **193**, 75–81.

# Preface

Sustainable groundwater development is a key environmental and social issue for the future. Whereas in the past the management of groundwater resources was based predominantly on the concept of the available renewable resource, today it is necessary to consider protection of springs, river flows and water levels dependent on groundwater discharges, while concurrently maintaining abstractions for water supply and economic benefit. Obtaining this balance between human and environmental needs, and protecting valuable groundwater resources from over-exploitation and pollution, presents a challenge to hydrogeologists that is reflected in the papers contained in this volume.

Following an introductory chapter that provides a discussion and definition of sustainable groundwater development, the remainder of the book comprises 23 papers organized into four sections: (1) approaches to groundwater resources management; (2) assessment and measurement of the impacts of groundwater abstraction on river flows; (3) risk assessment methodologies for developing and protecting groundwater resources; and (4) response of aquifers to future climate change.

In the section discussing approaches to groundwater resources management, the first paper presents an integrated hydrogeological interpretation of current understanding of the geological structure of the Bristol–Bath basin and its relevance to the sustainability of the thermal springs at Bath. The following papers present the views of regulators and academics in debating the current and future direction of groundwater resources management in the UK and Arabian Peninsula, succeeded by case studies that demonstrate experience in managing aquifers to meet environmental and water quality objectives both in the UK and overseas, including North & South America and South Asia.

With the adoption of the EU Water Framework Directive in December 2000, the introduction of the concept of integrated river basin management will require a greater understanding of river–aquifer interaction. Current ideas and methodologies for assessing the effects of groundwater abstraction on surface river flows are discussed in the section on groundwater abstraction and river flows with experience drawn from the UK and Germany.

Contamination of groundwater resources from surface-derived diffuse and point source

contaminants is a serious threat to the provision of groundwater supplies and the aquatic environment. On the other hand, for example in urban areas, a more flexible approach to water use for different purposes can enhance the availability of water. The papers in the section on risk assessment for groundwater management demonstrate modelling and risk-based methods for assessing aquifer vulnerability in rural and urban environments. Examples are presented for the urban area of Nottingham in the English Midlands, a grossly contaminated alluvial aquifer situated below oil refineries in Romania and a pulp and paper mill industrial complex in northwest Russia.

One of the greatest challenges for humankind in the 21<sup>st</sup> century is adapting to global climate change induced by increasing emissions of greenhouse gases. The general scenario for mid-latitudes under increasing average annual temperature is for increased rainfall in winter and drier summers. The translation of these changes into the potential consequences for longer-term management of groundwater resources is discussed in the last section on future climate impacts on groundwater resources. Two papers describe the results of using the scenarios produced by global circulation models (GCMs) on catchment water resources in several European carbonate aquifers and discuss changes in aquifer recharge, water levels, baseflow and groundwater chemistry.

This Special Publication of the Geological Society of London has its origins in the symposium on *Sustainable Groundwater Development* organized by the Hydrogeological Group of the Society and held at the *Geoscience2000* conference at the University of Manchester in April 2000. Following this symposium, additional papers were invited to supplement those papers given as oral presentations. In the process of compiling this volume, the editors are greatly indebted to the time and effort spent by the following referees in providing peer-review of submitted articles and also the input of the Series Editor, Dr Martyn Stoker, and the staff at the Society's Publishing House, including Angharad Hills and Diana Swan.

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October 2001

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