

## Book review

**Field Hydrogeology** (4th edn), by Rick Brassington, 2017. Wiley Blackwell, 294 pp., ISBN 978-1-118-397367, paper back, £39.50.

At the wilder fringes, road cyclists obsess over weight like jockeys do – perhaps even more so, since at least horse racers don't need to pedal their steeds up hills. Having shaved weight off the bicycle itself – at remarkable expense – the cyclist devotedly follows the latest diet. After all, losing five pounds by eating frugally is cheaper than finding the same mass saving by replacing bicycle steel and aluminium with titanium and carbon fibre. Useful equipment, such as bicycle pumps, spare tubes and emergency tools also fall under the weight-watcher's severe gaze – all must be carried, all must pay their way.

Even at the wilder fringes of the groundwater profession, hydrogeologists are not known for wearing lycra or obsessing about diet. Yet we do share, in a small way, the dilemma of the cyclist: what equipment to take into the field, and what to leave behind? This applies particularly when lots of walking is planned in out-of-the-way places, or on multi-day field excursions. Travel light and risk omitting some essential piece of kit? Or take the kitchen sink and risk exhaustion or heatstroke trying to carry it all? Some equipment manufacturers have yet to come to the portability party – most dip meters are plain awkward to carry far, and whilst small sampling pumps are beautifully light, the car battery that powers some of them is onerous to lug around. Some of today's field hardware is as bulky as ever, but knowledge and information are increasingly portable.

This brings me to the fourth edition of Rick Brassington's *Field Hydrogeology*. Well known in groundwater circles (the first edition was published in 1991), this excellent field guide has much to recommend it, not least its compact size and slight mass. Part of the publisher's Geological Field Guide series since its third edition, this updated fourth edition remains pocket sized – measuring about 18×12 cm. The text is a little smaller than before, but still clear and readable. It fits into the back pocket of my jeans, and wouldn't take up much room in a briefcase or a car glove box. My copy of *Field Hydrogeology* weighs 312 g, less than a pared-down bicycle tool kit. It's made to be carried, and to deal with questions or dilemmas that arise in the field. Its 294 pages contain a mass of useful information.

*Field Hydrogeology* is all about fieldwork. According to its author, it is '... a hands-on guide to field methods in hydrogeology'. After an Introductory Chapter covering groundwater conceptual modelling and report writing, the book's chapters follow a sequence similar to the order of work in a field investigation: A Desk Study chapter is followed by chapters on Field Evaluation and the various ways of surveying and recording Groundwater Levels. Chapter 5 is a useful reference on Rainfall, Springs and Streams – a fuzzy area for

some of us, particularly choosing the best measurement method or analysing the resulting data. Chapters on Pumping Tests, Groundwater Chemistry and Recharge Estimation are followed by a chapter on Special Techniques such as using artificial tracers, and a final chapter entitled Practical Applications that covers some of the main categories of hydrogeological investigations, from borehole prognoses to contaminated land work, geothermal studies and soakaway installations. The guide is nicely illustrated in colour with maps, diagrams, case history boxes, photographs and charts, and it's clearly and simply written too. It has appendices on safe working practices and on conversion factors, a list of useful references and further reading, and a fourteen-page index. The inside of the front cover has a grain-size chart.

The guide includes some hydrogeological theory, such as the interpretation of pumping tests and methods of recharge estimation, but it is no replacement for standard text books and bulkier references. Although it sticks mostly to British units, examples and practices, most of the information is universal (but including acre-feet in the conversion tables, plus a few other American idiosyncrasies and examples, would broaden its utility).

So, who should buy it? Anyone involved with hydrogeological fieldwork for a start – even those with long experience but who might need to look up a conversion factor, remind themselves of modern health and safety practices, or prepare for an unfamiliar area of investigation, such as draining an excavation. Junior hydrogeologists, field technicians, engineers involved with groundwater, utility managers, environmental activists, surface water specialists, well owners, nature lovers, and even lay folk with an interest in their local groundwater will instantly be wiser and better prepared with this guide in their pocket.

The guide functions on another level too: it emphasizes fieldwork and conceptual modelling as the foundation of good hydrogeology, and stands as a counterweight to what may be the growing allure of desk-based, remotely sensed and digital methods of groundwater characterization. These offer intriguing and valuable possibilities. But given the inherent complexity and unpredictability of groundwater flow through geological structures, sound fieldwork still rules. This guide reminds us of the central importance of field data collection, laying out clearly what, why, when and how field data should be gathered; if only all field equipment were as portable, as well put-together and as useful.

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