

Book Review

Monitoring for groundwater management in (semi-)arid regions
edited by Henny A.J. van Lanen, *Studies and reports in Hydrology 57*,
UNESCO Publishing, Paris, 224 pages.

When I was asked to review this book on groundwater monitoring in (semi-)arid regions, I wondered if such a book would be useful to groundwater practitioners in New Zealand because the techniques would be too specific to arid zone monitoring and water quantity issues would be over-emphasised in the material presented. Indeed, the book states that it is different to other monitoring handbooks because of "its restricted and more specific nature, i.e. oriented towards groundwater monitoring and (semi-)arid regions". However, if I were to find fault with the book (as a professional hydrologist from an arid area), I would say the largest problem is that the methods presented are too general and are not particularly specific to the arid zone. In fact, many of the chapters barely mention arid zone hydrology and they do not try to illustrate which techniques would be best employed in an arid climate. For this reason, the book may be of considerable interest to groundwater hydrologists in New Zealand.

The book is divided into two parts. The first part has seven chapters on basic frameworks for groundwater monitoring. The first three chapters include general frameworks for setting up regional monitoring programmes. Although these are supposed to be particular to (semi-)arid regions, in my opinion, the techniques are equally applicable anywhere in the world. Chapter 4 on specific monitoring does illustrate some concepts that are particular to (semi-)arid regions but the monitoring advocated by the author is not specific to the arid region. Chapter 5 on monitoring tools and types of recording is a useful summary of techniques used for measuring groundwater and vadose zone parameters. However, although the introduction to the chapter indicates that the author will describe the applicability of the techniques to the arid zone, there is little mention of which techniques are more suitable for different types of studies. In addition, frequent references to products available from the author's organisation detracts from the chapter as it seems that the point of the chapter is more to sell products than to illustrate useful techniques. The flow chart presented to illustrate the proper collection of groundwater quality samples is flawed and this is a major disappointment for me in the chapter. The diagram suggests that samples for alkalinity measurements should be filtered before collection. This would be a particularly bad practice in arid regions because samples may be close to saturation with respect to carbonates. Filtering the sample may lead to erroneously low alkalinity

measurements if carbonates have precipitated after the sample has been taken from the well. However, the chapter does illustrate a large variety of sampling tools and this will be useful to New Zealand scientists. The last two chapters are on statistical analyses and data management. These chapters will be very useful to New Zealand scientists, as the problems presented are generic to any groundwater sampling programme. However, chapter 7 is once again spoiled by an effort by the author to market a database management system being developed at the author's institute.

The second part of the book consists of seven case studies applied in (semi-) arid regions. Four of the seven case studies are from India, which I found to be a bit excessive. The studies range from optimising hydrograph network stations (groundwater hydrograph stations), monitoring of over exploited aquifers in India and Mexico, Monitoring saltwater intrusion and the occurrence of fluoride in groundwater, vadose zone monitoring and using remote sensing to monitor surface moisture. Of these 7 case studies, the best presented and most useful are probably the papers on fluoride monitoring and the optimisation of the monitoring network. The paper on fluoride monitoring used small scale monitoring networks to determine local recharge areas where fluoride concentrations are lower. Drinking water wells were then placed in these areas to provide water supplies for small villages. The paper on optimising the groundwater hydrograph network used simple statistics to eliminate superfluous wells from the network and reduced the number of wells required from 46 to 33 over an area of 9280 km².

Overall, I was disappointed in the fact that the book was not more specific to monitoring in (semi-)arid regions. However, this disappointment is tempered by the fact that the book will be much more useful to a broader groundwater community and may be useful in New Zealand groundwater studies, particularly in areas such as Marlborough, Canterbury, Hawkes Bay, and Gisborne where seasonal drought and heavy groundwater use are important factors in designing monitoring networks. I recommend the book as a general introduction to groundwater monitoring techniques, but it falls short of its goal of providing methodologies that are specific to the arid zone hydrology.

The paperback book is well presented and the figures and layout are of high quality. The authors are mainly European (11 of 19 authors) and this is a little disappointing considering the book is on arid zone hydrology. The book is available from the Division of Water Sciences, UNESCO, 1 rue Miollis, F-75732 Paris Cedex 15, France (ihp@unesco.org).

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