recommendations for fertiliser use, including addition of no more than 2000 mg of nitrogen kg^{-1} soil water added, regardless of contaminant concentration, or use of slow release nutrient sources.

Field scientists and engineers may find the final three chapters of the book most useful as they discuss practical methods for the bioremediation of hydrocarbons *in situ* and *ex situ*, and provide useful case studies from both polar regions. Walworth *et al*. describe the goal of cold-climate landfarming to be the alleviation of other environmental limitations (e.g. moisture, oxygen, nutrients) such that temperature becomes the limiting factor to bioremediation. Once these limitations are reduced, the soil-microbial-contaminant system can take advantage of natural seasonal warming of soils. If natural heating is insufficient to permit bioremediation at the desired rate, then thermally enhanced bioremediation (TEB) may be a solution, as discussed in Chapter 10 by Filler *et al*. As well as describing theoretical details, they provide case studies and information on designing a TEB system, including integration of oxygenation, fertilisation and thermal insulation systems. However, the cost of transporting fuel to Antarctic may make energy-hungry TEB systems prohibitively expensive. The final chapter discusses emerging technologies in soil bioremediation and groundwater treatment, and it is clear that systems exist for cleaning up oil-spills effectively in cold regions. However, what may be lacking in some parts of the Arctic and Antarctica is sufficient investment and political will to make large-scale bioremediation a reality.

The editors have successfully amassed much relevant information for researchers, engineers and policy makers. In particular, the authors make the case for more formal integration of legislation within regions and across cold regions as a whole, and have emphasised the need for more research on enhancing bioremediation under the wide variety of environmental conditions found in cold regions. The authors deserve much credit for guiding us skilfully through such a complex subject, for presenting information from diverse disciplines in an easily understood manner and for generating practical guidance based on solid field and research experience.

KEVIN HUGHES

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Permafrost Soils

Edited by Rosa Margesin
Springer, Berlin, 2008.
ISBN13: 978-3540693703, 348 pp. £113.

This book, perhaps inappropriately titled *Permafrost Soils*, is edited by Dr Rosa Margesin from the Institute of Microbiology, University of Innsbruck, Austria. The book is part of a soil biology series published under the auspices of the Amity Institute of Microbial Sciences, India. Rather than "Permafrost Soils," the book could more appropriately be titled "Biology of Permafrost-Affected Soils."

The book is divided into six parts, including i) properties of permafrost, ii) biodiversity, iii) biological activity, iv) global warming and permafrost, v) contaminants in permafrost, and vi) permafrost and extraterrestrial habitats. The 21 chapters generally have been prepared by experts in the field. Russian contributions are particularly noteworthy. The book heavily emphasizes microbiology. The chapters average 16 pages and are followed by extensive lists of citations. The tables and figures are clear but include only three poor-quality colour images. It is unfortunate that no effort was made to introduce or summarize each part to provide cohesiveness within the book.

Many interesting findings are reported, including the existence of old DNA and ancient protozoa in permafrost (two chapters) and the unexpected diversity of microbial communities in permafrost (several chapters). The chapter on genomic insights into cold adaption of permafrost bacteria (Bakermans *et al*.) was particularly interesting.

In addition to its emphasis on soil biology, the book differs from *Crysols: Permafrost-Affected Soils*, (edited by J.M. Kimble; published in 2004 by Springer) with its treatment on potential impacts of global warming on permafrost-affected soils. The five chapters in this part address global warming and thermokarst (Murton), mountain permafrost (Haeberli & Gruber), methane production (Wagner & Liebner), dissolved organic carbon release (Prokushkin *et al*.), and foundations of buildings (Shur & Goering). The book ends with a fascinating chapter on terrestrial permafrost models and analogues of Martian habitats and inhabitants (Demidov & Gilichinsky).

In summary, *Permafrost Soils* complements previously published books on permafrost-affected soil with its emphasis on soil microbiology.

J.G. BOCKHEIM