Problems of desertification

Desertification: Environmental Degradation in and around Arid Lands. Edited by Michael H. Glantz. Pp. xiv+346. (Westview: Boulder, Colorado, 1977.) $20.

THE United Nations Water Conference, held in Argentina in March, 1977, and the United Nations Conference to Combat Desertification, held in Kenya in August, 1977, reflect the worldwide attention now being paid to the destruction of arable or potentially arable land throughout the arid and semi-arid regions of the world. The volume under review comprises a collection of articles by specialists in a range of disciplines which examine and evaluate the social, political, economic, environmental and technical problems related to the causes and effects of desertification. Most of them are concerned, one way or another, with the Sahara and the Sahel savanna of Africa.

In the first of these articles, the editor outlines the approach of the United Nations to "desertification" or, as H. N. Le Houérou prefers to call it, "desertization". Glantz defines this as a global "environmental problem which is primarily national in cause and national in effect". The Sahelian states are among the poorest in the world and, therefore, "in need of financial, technical, moral and other support if they are to have any chance whatsoever to cope effectively with the problems that are linked to desertification within their borders". No-one, however, explains how one should refute the logic of the Sahelian peoples—if, during the last drought, two thirds of their cows died, then, by raising three times as many cattle, the original number might be expected to survive the next drought!

At least half of all the timber cut in the world is used as fuel for cooking or as a source of warmth. Eric P. Eckholm discusses the problem posed by an Indian official: "even if we somehow grow enough food for our people in the year 2,000, how in the world will they cook it?" The suicidal deforestation of Asia, Africa and Latin America will have to be reversed. The problem of ecological deterioration in Niger is discussed by James T. Thomson; that of pastoral development in Somalia by Jeremy Swift. Authors of other chapters include Richard W. Katz, William W. Kellogg, Stephen H. Schneider and Helen Ware. Surprisingly, the Interim Report of the South African Drought Investigation Commission of April, 1922, is reprinted, without comment, as chapter 10. This historical document shows that neither today's problems, nor their solutions, are new—although the recommendation that jackals should be exterminated might no longer win universal approval.

The review of problems of desert land reclamation in the USSR, by A. G. Babayev, includes an appendix consisting of abstracts of 24 papers published after a symposium held at Ashkhabad, in 1976. Babayev concludes that scientists "must now concentrate on determining the optimum limits of harmonic development of society and nature". "The Communist Party and the Soviet government" seem to have learned that nature may be tamed, but cannot be conquered by man!

A book on deserts seems an unlikely place in which to find a discussion of the world's oceans, but J. Dana Thompson's interesting chapter examines the notion of biological deserts in the ocean, and assesses the limitations of the sea as a biological resource which, however, could be made somewhat more productive by mariculture, the reclamation of polluted areas, harvesting unconventional species, and the abolition of over-fishing. As in the case of all the problems of environmental degradation, we know *what* should be done but not *how* it could be accomplished. The matter is one of individual responsibilities.

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Transport properties of simple liquids

Classical Kinetic Theory of Fluids. By P. Résibois and M. De Leener. Pp. xv+412. (Wiley: New York, London and Toronto, 1977.) £22.

"AMONG the many available texts on statistical mechanics, few, if any, give the reader a coherent and sustained introduction to the various methods that have made non-equilibrium statistical mechanics so successful." This quotation from the preface understates the difficulties facing a research worker in the field. If he tries to piece together the original literature, he meets mysterious concepts like "plateau time", "friction constant" and "autocorrelation functions"; and he can have a hard time in deciding whether a theory contains, or does not contain, adjustable constants.

This book contains a connected account of the various approaches to the problem of predicting the transport coefficients of a "simple" liquid. Nearly all the work is concerned with the rigid sphere and n'th power repulsion models. Theoretical predictions are compared with "computer experiments" rather than with measurements on the rare gases. This is because of the complicated actual forces between real molecules of "simple" liquids, and also because information such as the time variation of correlation functions can be obtained directly from computer experiments, but can only be inferred indirectly from neutron scattering experiments on real liquids.

The only proper way of dealing with the famous "irreversibility paradox" is to proceed via Liouville's equation. This is done in section C of the book, after two introductory sections on stochastic processes and on various forms of the Boltzmann equation. The Boltzmann equation has essentially irreversible solutions, and the central problem is to show that such an equation can be consistently derived from Liouville's equation by proceeding to the thermodynamic limit in a large assembly.

This programme cannot be carried through rigorously for any physically realistic model, but section C makes it clear that most, if not all, of the difficulties of principle have been gradually overcome, and that the remaining difficulties are almost certainly technical. The reader is led through some far from simple work with great clarity, and the style is pleasant and informative. No attempt is made to disguise the difficulties still outstanding —for example, the long term behaviour of the correlation functions and the fact that some treatments give transport coefficients that vary non-analytically with density (or diverge). Paradoxically, such difficulties seem to be particularly severe for two-dimensional assemblies. A final section discusses the, more formal, theory of transport coefficients based on time-dependent correlation functions.

The appearance of the book is most timely. It is splendidly printed and produced and there is a good index and some clear figures. The bibliography is surprisingly short but probably adequate, consisting largely of books and review articles rather than original sources. The authors have certainly achieved the objectives set out in their preface.

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