

BOOK REVIEWS

Can desert encroachment be stopped? (Eds. A. Rapp, H. N. Le Houérou and B. Lundholm) Ecological Bulletins No. 24 published by Swedish National Science Research Council, Stockholm (1976). 241 pp. (Copies can be obtained from the Editorial Service of NFR, Box 23136, S-104 35 Stockholm, Sweden.) Price: 50 Swedish Kroner.

We in Australia are fortunate in that the population of our semi arid and arid lands is low, and, perhaps more importantly, the proportion of the population dependent on these lands is quite small. Because no one starves to death in Australia as the result of drought, we do not treat the need for sound management of the arid zone in this, the driest continent, with the urgency it deserves.

During the 1965 drought in western Queensland I recall being asked by a visiting TV crew to show the cameraman "some dead animals". Dead grass, trees, sheet eroded ridges and dust were of "insufficient dramatic impact"! Of course the long term significance of these latter effects had far greater implications for the country than the sight of those few bleached bones. Subsequently, as the great tragedy of the Sahelian drought of 1968-73 unfurled, I wondered whether the emaciated and debilitated bodies of the Ethiopians thrust upon our TV screens would provide sufficient 'impact' to increase our awareness of the extent and importance of the arid and semi arid zones; the more so in a world increasingly dependent on all of its limited space and resources. Hopefully it has.

This book is concerned with the problems of management of land, vegetation, water, animals and people in arid zones. Specifically it deals with those countries fringing the Sahara in Africa but the principles enunciated and the case studies presented have application or parallels in all arid and semi arid regions (which comprise one third of the earth's surface!).

The book, in part, was compiled as a result of the Sahelian drought and provided a background document for the United Nations Conference on Desertification held in Kenya in August 1977. I doubt whether publications which may subsequently arise from that meeting will give a better compendium of the problems of arid regions and the manner in which we might try to overcome them.

There are thirteen chapters in the book largely written by contemporary European or expatriate European scientists with wide experience of living and working in arid zones. The quality of the individual chapters is generally good, the style remarkably even, and it is pleasing to note the extent of cross referencing provided which gives a continuity and cohesion often lacking in multi-authored publications.

The title of the book asks the rhetorical question "Can desert encroachment be stopped?" However this question is not really addressed until the final chapters are reached. The introductory chapters give a description of the problems of arid regions but, more importantly, detail the traditional approach to the use of these areas which has largely been disrupted, in a contradictory sense, by improved technology. For example, improved veterinary and medical knowledge has led to much greater stress being placed on resources which evolved, in response to erratic and limited rainfall, under a continuing cycle of feast and famine. The lesson is that international and national agencies which implement such improved technology should not be deterred from such programmes, but compelled to also provide appropriate adjustment planning so that the mid and long term implications of disturbing the traditional ecological balance are recognised and accounted for. The most telling argument of this book is not that solutions are unknown to many of the biological and physical problems of marginal arid lands, but that specialists providing and implementing the solutions have often failed to take into cognizance the social and economic factors necessary for their successful adoption.

In a world increasingly dependent on all of its resources it is fallacious and unrealistic to propose that we should 'lock up' our arid lands. The use and management of these lands requires an imaginative approach which combines technological advances with a recognition of their socio-economic ramifications and the preparedness to learn from the lessons of history.

This book should be read by all administrators, scientists and land users concerned with resource use (arid or otherwise). That it has been produced under the auspices of the Swedish National Research Council should provide food for thought to those Australian and U.S. authorities who have provided 'experts' in arid land use to developing countries in the past.

W. H. BURROWS

A Manual of Ghana Grasses, by R. Rose Innes, with a key to the species by W. D. Clayton, published by the Ministry of Overseas Development, Land Resources Division, Surbiton, Surrey, England. Price £1.50.

This book combines a discussion of the ecology of Ghana's grasslands with an account of grassland management, potential for improvement and finally keys for and descriptions of Ghana grasses. It should be invaluable to extension workers, agricultural workers and students in Ghana and other countries in tropical Africa; also to educationists and advisers from more developed countries who have an increasing responsibility to help tropical Africa to become more self-sufficient.

The first few sections of the book will also be of more general interest to Australian readers lacking experience in Africa. The somewhat comparable climates of parts of Ghana and tropical Australia might suggest comparable problems and solutions. However, the long history of settlement in Ghana, the widespread prevalence of stock diseases, in particular trypanosomiasis, and the existing socio-economic structure of the indigenous peoples, have given rise to a suite of problems quite distinct from those found in Australia. It is hence a mistake to believe that grazing systems proven to be successful in northern Australia can be transplanted to West Africa without modification.

The vegetation zones and major grassland communities are discussed in the first section of the book with an emphasis on the ecological principles of succession. In all the vegetation zones the importance of man's activities in preventing the development of climax vegetation, through shifting cultivation, grazing practices and the widespread use of fire, is emphasized. Grassland communities characteristic of different climatic, management and edaphic situations are described and amply illustrated with photographs. Quoting from the text "A thorough knowledge of the stages of plant succession and their component species is the basis of good range and pasture management", and this is very true of grasslands everywhere.

Then follows a short section on grasses and associate species as animal feed. Seasonal variation in pasture yield and quality, and animal weight gain is discussed, and the importance of browse species is emphasized.

The section on management and development on Ghanaian grasslands stresses the importance of the socio-economic background of the people in any consideration of pasture improvement. Increasing population pressures have resulted in the shifting cultivation cycle deteriorating from a 20 year phase under bush to less than five years and finally to continuous cultivation. The introduction of mixed farming should prevent the deterioration of fertility which occurs at present with too short a fallow between cultivation periods, and in addition provide a source of power for cultivation. Increased animal production will also provide protein for the expanding urban population. Improvement of animal production should result from provision of

watering facilities, planting browse shrubs and legumes, control of cattle diseases, improved animal husbandry and changes in land tenure systems. The discussion on management is based on a wide knowledge of grassland ecology, agronomy and sociology and in consequence the recommendations made are invariably sound.

The final section of the book consists of keys to the 95 genera and 308 species of Ghanaian grasses. Each species is briefly described, and a single representative species in each genus is well illustrated with a full page line drawing.

This book is an authoritative text, and should be of great value to grassland workers in West Africa. Its low cost of £1.50 for a book of 265 pages, puts it within the reach of the Ghanaian research workers who will most benefit from it.

J. B. HACKER

Nitrogen, phosphorus and sulphur—Global cycles. Svenson, B. H. and Söderlund, R. (Editors) 1976. Ecological Bulletins 22/SCOPE Report 7. (Swedish Natural Science Research Council: Stockholm.)

This Bulletin is part of a series dealing with ecology published by the Swedish Natural Science Research Council. This particular volume was also sponsored by SCOPE—the Scientific Committee on Problems of the Environment. The writing is clear and straight forward, but assumes a sophisticated understanding of scientific terms.

Three chapters dealing respectively with the global cycles of nitrogen, phosphorus, and sulphur, make up the core of this Bulletin and account for 111 of its 191 pages. They are preceded by two general introductory chapters, one by E. Eriksson and T. Rosswall entitled "Man and biogeochemical cycles: impacts, problems, and research needs" and the other by B. Bolin on "Transfer processes and time scales in biogeochemical cycles".

Readers of Tropical Grasslands will find the three papers on global cycles of considerable general interest, but not of much help in understanding the fate of fertilizers or trends in soil fertility on individual farms or fields. The global calculations inevitably obliterate local details. Nevertheless, these authoritative reviews provide a very handy, concise source of information for people wishing to join in the environmental debates of the future. For instance, Söderlund and Svensson give a "ballpark" figure for oxides of nitrogen released into the atmosphere by high-temperature combustion of fossil fuels in vehicles and power stations, while Pierrou's chapter on phosphorus concludes with the interesting, and probably controversial assertion that "Phosphorus reserves will probably not be limiting to man since the size of the mineable phosphorus reserves depends more on price, or rather on reserves of energy, than on actual geological scarcity". Pierrou also concludes that man's activities are tending to concentrate the world's phosphorus in geographically limited areas.

Granat, Rodhe and Hallberg have written a comprehensive review of the global sulphur cycle. Readers who have experienced a smog in north-western Europe will have no difficulty in believing their conclusion that at least 50% of the sulphur emitted to the atmosphere through man's activities in that region is deposited within a distance of about 1000 km.

The remainder of the Bulletin consists of four papers that are narrower in scope and not so obviously related to global cycles. The first, by five Soviet scientists, reviews the cycles of seven elements (carbon, nitrogen, phosphorus, potassium, calcium, magnesium and sulphur) in some natural zones of the European USSR. This is a field of research in which Soviet scientists have made important contributions to knowledge.

The second describes the terrestrial nitrogen cycle between microorganisms, vegetation and soil. The author (T. Rosswall) shows that 95% of the global nitrogen flow occurs within the soil and between soil and vegetation. The microbial conversion (mineralization) of organic nitrogen to ammonium is undoubtedly one of the most important of the soil nitrogen processes and very slow (1 to 3% per growing season) compared with many other soil conversions.

The remainder of this chapter is devoted to interesting comparisons between the nitrogen cycles of several terrestrial ecosystems—a striking comparison is drawn between the nitrogen cycle of a temperate deciduous forest, where the annual additions and losses of nitrogen are quite small, and nitrogen-fertilized grassland where the large additions of nitrogen as fertilizer tend to be counterbalanced by large losses of nitrogen to air and water.

The third of those chapters deals with pollution of waters by nitrogenous compounds from agriculture in Sweden. It refers to three types of control measures: advising farmers (effective only when the individual farmer does not lose much by following the advice), compulsory controls, and price-linked controls (for instance, an increase in the price of nitrogenous fertilizers to discourage their use). The final chapter reports the results of measurements on sediment cores from the Black Sea. It appears that agricultural activities in the region draining to the Black Sea have accelerated soil erosion by a factor of about 3 over the past 1500 years.

In summary, this bulletin is strongly recommended to those seeking a concise introduction to some of the major environmental issues of our time.

E. F. HENZELL