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BOOK REVIEWS

State of the Environment in Southern Africa

EDITED BY M. CHENJE AND P. JOHNSON

xx + 332 pp., figures, 225 × 195 3 17 mm, ISBN 0 7974 1374 X paperback, £26.50, US$47.50, Harare, Zimbabwe: South African Resource and Documentation Centre, 1994

Major political upheavals and transformations, coupled with a burgeoning human population, mean that there are exceptional environmental challenges to be met in many parts of Africa. This book covers these challenges for the southern half of Africa, including Angola, Zambia, Tanzania and the countries lying to their south. Heads of the Southern African Development Community (SADC) recognize the importance of the environment, and the treaty establishing the Community commits members to '... achieve sustainable utilization of natural resources and effective protection of the environment ...'. The degree to which this noble goal has been met has been influenced by a number of factors, including political stability and economic strength. Some of these countries have been plagued with war, others have seen unparalleled shifts of political power and transformation. Yet the region has an extraordinary environmental richness, and the future welfare of its inhabitants will be closely linked to the environment.

This book was born out of a desire to summarize and to make environmental information accessible, particularly to managers and politicians faced with the difficult task of balancing needs for human development against environmental standards. It was initiated and developed by the Southern African Research and Documentation Centre, whose members spent three years collecting and analysing sources of information, distilling issues that should be covered, convening workshops with experts and then drafting chapters for criticism by a Scientific Advisory Committee. On the basis of the resulting manuscript, the Scientific Advisory Committee held another workshop to forecast the region's environmental future.

This rather complicated procedure has resulted in a book that has great strengths but also great weaknesses. The format of the book is one of its strengths. It is designed to be user-friendly, and it achieves this objective in several ways. The text is deliberately non-technical and is written in a pleasingly consistent style for a book that unites the efforts of six different authors. There are clear and interesting illustrations, including the occasional punchy cartoons that make their point vividly and with few words. Background and, often very interesting, case histories are inserted as 'boxes' that do not intrude on the flow of the text but substantially increase the value of the work. For example, there are inserts entitled 'Who is a poacher?', and '*Acacia saligna*: resource or invader' that compel the reader to re-evaluate problems instead of adopting a view based on European society, science and norms. At the end of each chapter is a brief but useful list of 'linkages' that cross-refer to other relevant chapters. The references at the end of each chapter tend to be inaccessible because they draw extensively on 'grey' literature and in some cases do not cite sufficient details.

'*State of the Environment in Southern Africa*' is divided into three parts. Part 1 reviews background information in a series of five chapters dealing with socio-economics, history, policy, ecozones and climate. I found the first three chapters particularly interesting because they included details of traditional laws and methods of environmental management. This opening review is an important reminder of past approaches often overlooked with the advent of colonialism. I did, however, find myself irritated by a tendency towards political correctness in addressing environmental problems. Not everything can be blamed on colonialism, and many traditional ways of managing the environment were ideal when population densities were relatively low, but can only naively be applied to a modern situation in which population densities are high and growing rapidly. For example, early sections of the book discuss the advantages of slash-and-burn shifting agriculture, while elsewhere it is made clear that such shifting agriculture has led to soil degradation in vast areas of central Africa. There are also inconsistencies that have more to do with political viewpoint than objective comparisons. For instance, traditional terrace-contouring is praised, whereas contouring introduced by colonial agriculturists is condemned!

Part 2 sets out a series of environmental issues in seven chapters: soils and land use, woodlands and forests, wildlife and protected areas, freshwater resources, marine ecosystems, pollution and armed conflict. These chapters can be read independently, depending on your interests. They are, however, of variable quality. The chapter on wildlife and protected areas is too superficial and, rather surprisingly, avoids currently contentious issues. The network of protected areas is indeed 'extensive, perhaps unequalled in the world', but its effectiveness varies greatly from region to region. No-one can pretend that the once-magnificent parks of Angola and Moçambique were effective during the war-ravaged years in those countries. The benefits and problems of protected areas receive scant treatment, and issues such as culling in reserves and the sale of ivory from excess stocks are not confronted and debated in a manner that would allow a politician to develop an informed opinion.

Perhaps because it is closest to my heart, I found the chapter on marine ecosystems particularly weak. To be told of 'endangered mammals, such as sharks' doesn't instil confidence! Sandy beaches receive a terse quarter of a page, with no mention at all of probably the most critical management issue, maintenance of natural processes controlling supply and removal of sand. Rocky shores are abandoned with equal brevity, and no mention is made of the impacts of subsistence harvesting. Salt marshes and coastal vegetated dunes, arguably among the most vulnerable coastal systems, are not mentioned. An oil-spill which is known to have had astonishingly little effect on sea life is described as a 'disaster affecting the whole marine ecological system'. The statement that 'there is little information on ... the ecology and dynamics of marine ecosystems in the region' ignores a rich body of literature that extends back 100 years. These errors and inadequacies reflect two things: insufficient input by marine experts, and a reliance on popular articles and 'grey' literature rather than primary journals.

Part 3 outlines global climate change (including a delightfully challenging box 'So you think global warming is a problem?') and then provides a synoptic chapter on trends and scenarios. Both chapters are interesting and the latter is provocative. The central messages that emerge are the need to attack poverty and reduce population growth, and the need to involve people in environmental management. Several practical and important suggestions for tackling these issues are outlined.

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I have mixed feeling about this book. It is ambitious in its goals, it should meet an important need, it is well constructed, it has involved many people, and it does contain challenging and well-presented material that should make every practising ecologist, manager and politician sit up and think. Set against these praises, there are errors and inconsistencies and obvious omissions that blemish the book, and I kept wishing that the final product had been more critically vetted to eliminate these deficiencies. The book is definitely worth reading, but it does need to be read critically and with the attitude that not everything in it is the gospel truth. Despite its deficiencies it must be recognized as a brave book. If it serves 'to inform, motivate and empower southern Africans at different levels of decision-making to enhance . . . conservation programmes . . . and to build upon good land-use practices', it will more than earn its keep. A fully-revised and corrected edition is an urgent necessity.

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Sustainable Development: an Introductory Guide

BY DAVID REID

xx + 261 pp., illustr., index, 21.6 × 13.4 × 2.2 cm, ISBN 1 85383 241 3 paperback, £12.95, London, UK: Earthscan Publications Ltd, 1995

The Earthscan Reader in Sustainable Development

EDITED BY JOHN KIRKBY, PHIL O'KEEFE & LLOYD TIMBERLAKE

ix + 371 pp., index, 23.2 × 15.2 × 3.0 cm, ISBN 1 85383 216 2 paperback, £14.95, London, UK: Earthscan Publications Ltd, 1995

Some words certainly become fashionable. 'Sustainable' is perhaps the word of the 1990s, first being used in British legislation in its current, ecological sense in 1991. In general it carries the connotation of goodness; if you can say that whatever it is that you are doing is sustainable, then the implication is that it is being done in a good and sensible way. But there has to be more to the word 'sustainable' than just using it as an adjective in whatever you say or write. How do we know that it is sustainable? How can we distinguish something that is sustainable from something that is not sustainable? Is it such a 'black and white' concept, or are there shades of sustainability? Can something be nearly sustainable or only slightly sustainable? There is clearly an intellectual challenge here in understanding the concept and in identifying indicators of sustainability.

David Reid's book gives a measured introduction to the subject, being divided into four parts. The first deals with the 'global crisis', fully exploring the unequal distribution of wealth, with the poorest 20% having only 1.4% of the world's total income and the richest 20% having a massive 82.7% of that income. Yes, this is important, but the analysis of the root problem, the human population explosion, tends to be rather summarily dealt with. True, the reader is reminded of some of the words of Paul & Anne Ehrlich, but you are left with the questions 'Which is the more important, population size, per caput consumption of resources, or ecological efficiency of the economy?'. The second part of the book, as we might expect with such a new subject and, in this context, newly-coined word, explores what sustainability means. This stems from the era of the Brundtland report – a seminal report that stirred, albeit briefly, the consciences of so many politicians and policymakers. It brings us face-to-face with some difficult concepts – it will never be politically popular to try to reduce the consumption of resources or to reduce personal choice in the way that resources are used. The first half of the book therefore paints a potentially gloomy picture, retreading well-trodden ground.

The second half of David Reid's book is more forward-looking. Some gloom remains, such as the analysis of obstacles to 'sustainable development'. However, the emphasis is on a human society with equal opportunities. The analyses are human-centred: 'A sustainably developing society will . . . insist on each individual's right to fulfil his or her needs and on the provision of equal opportunities for all to develop their abilities, and it will allocate resources accordingly' (page 160) is a quotation that points the way to a sustainable future as seen by the author. There almost seems to be a series of slogans in the sub-titles, such as 'putting people first', 'empowerment' or 'North–South relations'. The author's strong political view comes over, but in the second half of the book the methods of solving human population increase are not seen as a part of the attainment of a sustainable society. Nor is it made clear that it is chiefly (perhaps only) environmentally that development can be effectively sustainable.

In complete contrast to Reid's book is the book edited by John Kirkby *et al*. Their book is arranged in ten sections, each with two or more essays (there is a total of forty topic essays, together with an introductory essay). As the editors say, 'The rapid acceptance of the ideal of sustainable development is not surprising since it is interpretable in so many different ways'. The diversity of writers and the diversity of subjects does give a taste for the diversity of meanings of sustainable, which, when coupled with development, were said to have been around seventy in 1992. The groups of essays start with an analysis of biodiversity, explaining both scientific and economic aspects of that rather ill-defined word. Then two essays address aspects of climate change and energy planning, after which a collection of four essays address head-on human population size and what is referred to as 'the biggest challenge' of stabilizing it. Politics and medical science are intertwined, but the essays contain a good analysis of why contraceptive programmes have not always been successful.

Four of the sections deal with aspects of land-use – agriculture, industrialization and pollution, urbanization and health, and 'The Commons'. The essays take different perspectives, including as they do writers from both the developed and developing worlds. There is an emphasis on the Indian sub-continent which is perhaps useful in giving a reader from the developed northern hemisphere a perspective on Indian thinking and approaches. As agriculture is considered, why not also forestry when wood for fuel is in so great a demand in so many parts of the world? When two of the biodiversity essays are concerned with marine mammals, why is there no section on fisheries and harvesting from marine and freshwater ecosystems? Perhaps there is already too much material for a book to allocate space to these two important uses of land and water resources, but the book is poorer without such analyses.

The book ends with three sections containing eleven essays grouped into 'environmental security', 'empowerment', and 'environmental economics'. Several of these essays investigate institutional structures and attitudes – is this really the stuff of

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'sustainable development?' The message comes through that the involvement of far more people is needed if government policies are to be sustainable, but then we can already see the spectres of institutions out there somewhere waiting to come and take over the present-day institutions. Will they be any better? Only time will tell.

I wish that writings on 'sustainable development' were more interesting, more stimulating, and less jargon- or slogan-prone. Neither of these books is easy to read. David Reid's book is a coherent whole, leading the reader around some science-tinged subjects and guiding him or her into a single political direction. There was a point where I felt like stopping and asking why I was going down this one road. Is there only one path to environmental sustainability? Has it become a religion? John Kirkby *et al*.'s book has no such directional trend. It is preferable to look at the contents list and to pick and choose amongst the essays, giving a greater feeling of being in control. Without explicitly saying so, it implies that there are different paths to a sustainable future. The path in India or that in the United Kingdom may have a common goal, but the paths follow different routes. However, if that goal is to be achieved, then we need something which is going to make sustainability a living, even exciting, and achievable, ambition. I doubt that much more than lip-service will really be paid to it as long as it preaches doom and exhortations to reduce resource consumption; these are too alien to what every person wants to achieve in their lives or to see in the lives of their children. There must be some way to move towards a more sustainable future than that being indicated by our present actions and attitudes.

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Conservation Atlas of Tropical Forests: Asia and the Pacific

EDITED BY N. MARK COLLINS, JEFFREY A. SAYER AND TIMOTHY C. WHITMORE

256 pp., illustr., 30.3 × 23.6 × 2.3 cm, ISBN 0 13 179227 X hardback, US$95, New York, NY, USA: Simon & Schuster, 1991

Conservation Atlas of Tropical Forests: Africa

EDITED BY JEFFREY A. SAYER, CAROLINE S. HARCOURT AND N. MARK COLLINS

288 pp., illustr., 30.3 × 23.6 × 2.4 cm, ISBN 0 13 175332 0 hardback, US$95, New York, NY, USA: Simon & Schuster, 1992

Conservation Atlas of Tropical Forests: the Americas

EDITED BY CAROLINE S. HARCOURT AND JEFFREY A. SAYER

335 pp., illustr., 30.3 × 23.6 × 2.5 cm, ISBN 0 13 340886 8, hardback, US$100, New York, NY, USA: Simon & Schuster, 1996

The approximately 1300 million hectares of tropical forest still remaining on Earth today straddle the Equator in a more or less wide, though discontinuous, swathe around the world. In round figures, 20% of this shrinking habitat is found in Asia and the Pacific (cf. the first volume), a further 30% in Africa (cf. the second volume), and the remaining 50% in the Americas (cf. the third volume).

The remaining tropical forests of the world are scattered throughout the sovereign domains of 90 or so countries. Those countries are for the most part abjectly poor, many have explosively-growing populations, and the majority are in the grips of despotic and corrupt regimes. The tropical forests, many of them enclaves of great natural beauty and amazing biological diversity, continue to disappear at a tragic rate. Those losses result primarily from a combination of hunger for new agricultural lands and craving for exportable resources.

As this set of volumes makes clear, the outlook is bleak for many of the remaining tropical forest areas of the world, but not hopeless, except in some countries. For example, what very little still remains of the tropical forested areas in the smaller Caribbean and Central American countries and on such island countries as Madagascar, must now be truly and zealously protected, whereas there appears still to be considerable hope for conserving an adequate fraction of the tropical forests of South America. It should be mentioned that the estimates of tropical forest coverage presented in the volumes under review differ a bit from (being generally somewhat lower than recent estimates) those published by the Food and Agriculture Organization of the United Nations in 1993 in its *Forest Resources Assessment 1990: Tropical Countries*. The estimates in the present volumes would seem to be the more reliable ones.

Each volume is in two parts, comprising a series of pertinent regional overviews (in number 11, 10, and 9, respectively) followed by very detailed (and well-referenced) country-by-country analyses of conservation status and trends. In each volume, the regional overviews include treatments of exploitation, of wildlife, of indigenous people, of protected areas, and of suggested future actions. The third volume presents an innovative approach to establishing conservation priorities through a study of the endemic birds.

The numerous detailed individual-country studies provide information not readily available elsewhere; in some cases available nowhere else, at least in English. Each country study is prefaced by a standardized summary of useful geographic, demographic, and natural resource, data, and each goes on to present a botanical summary before going into the condition, exploitation, and prognosis, regarding the tropical forest types, of that country. Most importantly, each country study is complemented by a superb original colour map (many at a scale of 1:3 000 000). The utility of each volume is further enhanced by a glossary of arcane terms and by separate indices for flora, fauna, and general subject-matter.

The overall project was carried out under the auspices of the World Conservation Union (IUCN), with much support from the World Conservation Monitoring Centre. However, it would have benefited from the additional support of the IUCN Environmental Law Centre. Each volume has been co-authored by numerous local field workers (128, 116, and 131, respectively) having extensive on-site experience in tropical forest ecology and conservation.

It is clear that, in order to address the problem of conserving the tropical forests of the world, its several components must first be characterized and quantified, something that these studies go a long way towards accomplishing, although rather more successfully in the fields of geography and ecology than in those of policy, law, and diplomacy.

Finally, it might be noted that there is some overlap in these volumes with *Protected Areas of the World: a Review of National Systems*, published in four volumes (1726 pages) by the IUCN in

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1992. However, the present three-volume *Atlas* not only contains regional overviews of generally high quality (there are none on protected areas), but also has more comprehensive conservation information for each of the countries it covers, and far better maps.

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Wastewater Management for Coastal Cities. The Ocean Disposal Option (2nd ed.) Environmental Engineering Series

EDITED BY CHARLES G. GUNNERSON AND JONATHAN A. FRENCH

x + 345 pp., 24 × 15.3 × 1.8 cm, Illustr., ISBN 3 540 59216 4 hardback, DM166.42, Berlin / Heidelberg / New York: Springer Verlag, 1996

The volume is placed under the generally all too well-known threat to coastal cities' environment due to economic and demographic pressures. Admittedly, massive investments have been made in water supply and sanitation systems. Qualitative health and environmental benefits have been attained, yet post-audits have been few and far between. The goal of the volume, put together by two editors and eight contributors, is to make these investments more effective and more efficient.

This work is constructed on three premises: sustaining coastal cities and their dwellers is essential, and coastal waters must also be sustained, keeping in mind that, unlike the open oceans, they are not large and deep and stable; these goals can only be attained by cooperation and consensus. This is also a teaching book, as it includes rather well-known generalities and considers the entire spectrum of coastal-zone problems. A panorama of oceanography is covered in 48 pages. Ecological and hydraulic designs follow, with due consideration for public health and wastes, but I wonder whether two pages on ocean dumping and three on eutrophication really suffice. The hydraulic design merits 50 pages and the authors have attempted to cover as comprehensively as possible the topics to be considered; an in-depth treatment is impossible, of course.

If construction materials merit a scant eight pages, stress analysis and corrosion control are handled in five and seven pages, respectively. I am a bit happier with the coverage of on-bottom stability. Obviously the majority of the text deals with ocean outfall construction and subsequent monitoring. Case studies fill just over 100 pages. References are grouped after each major topic and are generous. A satisfactory index is provided.

The book is well presented and the smaller typeface has allowed inclusion of more material than the number of pages would intimate. It is a volume that will be very useful to those requiring an overall picture of the problems and a short briefing on those that face us in the coming century.

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Biodiversity and Conservation of Neotropical Montane Forests

EDITED BY STEPHEN P. CHURCHILL, HENRIK BALSLEV, ENRIQUE FORERO AND JAMES L. LUTEYN

702 pp., ISBN 0 89327 400 3 hardback, Brony, New York, NY, USA: New York Botanical Gardens, 1995

Medicinal Resources of the Tropical Forest: Biodiversity and Its Importance for Human Health

EDITED BY MICHAEL J. BALICK, ELAINE ELISABETSKY AND SARAH A. LAIRD

ISBN 0 231 10170 8 cloth, £50.00, ISBN 0 231 19171 6 paperback, US $35.00, Irvington, NY, USA: Columbia University Press, 1996

Plants, People and Culture: The Science of Ethnobotany

BY MICHAEL J. BALICK AND PAUL A. COX

228 pp., ISBN 1040 3213 hardback, US $32.95, New York, NY, USA: Scientific American Library, 1996

Of books on tropical forests, there are no end. Well might the experts keep producing them: what we primarily know about the forests is that we still know next to nothing about them! So these three books are specially welcome additions, insofar as they illuminate scientific sectors of front-rank importance.

The first book deals with neotropical montane forests, which are the most species-rich of all forests and feature quite remarkable levels of endemism. Indeed, they are a kind of global epicentre of biodiversity, mainly concentrated at mid-elevations. Yet they have limited expanse. The band between 500 and 1500 m altitude on the eastern Andes enjoys high year-round rainfall and fertile soils, both being prime factors in the abundance of species. In a belt generally less than 50 km wide and sometimes as little as 25 km, and 2200 km long from southern Colombia through Ecuador along the Amazonian fringe of Peru, there are no more than 10 000 km^2 of forest. Yet in southeastern Peru, the forests of the 15 000 km^2 Manu Park contain at least 8000 described plant species, or almost half as many as in the 520-times larger USA. There are also 200 animal species, which is more than in the USA and Canada combined, plus 900 bird species, or more than 10% of all those on Earth. Of 1200 bird species in Peruvian Amazonia (75% of the country's total), there are more above the 1000 m altitude contour than below.

Much the same applies in eastern Colombia and Ecuador, and on the western slopes of the Andes too. Moreover, on both sides of the range, the montane slopes are divided by deep valleys. In just eight valley systems of eastern Peru, several as small as 5000 km^2 in extent, there are 65 endemic bird species; and for vertebrate species generally in five separate drainages, the endemism level is approximately 30%, while plant endemism is at least 25%.

All this is documented in detail in the splendid book edited by Steven Churchill and his colleagues. It contains chapters by some 80 forest *aficionados*, the majority of them being from the neotropical countries concerned. The book opens with a section on the palaeobotanic background, followed by a review of present-day floristic inventory and ecological studies. Then we find sections on taxonomic diversity (with emphasis on plants, both higher and lower), and the book winds up with a section on human impact and exploitation of montane environments, plus a section on future conservation. It all makes for a splendid compendium of information on those exceptional forests.

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The book edited by Balick *et al*. covers the contributions of tropical forest plants to human health. Each time we visit the chemist, there is one chance in four that what we purchase, be it a medicine, drug or pharmaceutical, would not be there on the sales counter if it were not for start-point materials from plants. We enjoy these products after pharmacognosy experts have looked at only one plant species in one hundred to assess its value to modern medicine. There must be a vast pharmacopoeia waiting from us in tropical forests, provided the scientist can get to the plants before the chainsaw man gets to their habitats.

Of the 29 mostly fine chapters by 53 scientists, the one by Peter Principe is specially illuminating. Plant-derived anti-cancer drugs now save 30 000 lives in the USA each year, with economic benefits already amounting to an estimated US $370 thousand million (1990 dollars), in terms of lives saved, suffering relieved, morbidity reduced and worker productivity maintained. We can at least double these figures to determine values for all developed nations. For comparison, Britain's GNP is a little over $1 million million. Many anticancer plants are to be found in tropical forests, and this too is where the great majority of extinctions are occurring. Suppose that until the year 2050 we witnessed the extinction every two years of one plant species with medicinal or pharmaceutical potential. The estimated cumulative retail-market loss from each such extinction would amount to US $12 thousand million for the USA alone.

All in all, the book is thoroughly recommendable. I know that I for one shall be constantly referring to it.

The third book, by Balick and Cox, deals with plants useful to humans, especially via medicine, together with an extended overview of ethnobotany. There has long been a profound relationship between people and plants. They impinge upon our lives in dozens of obvious ways each day, and double-dozens of less apparent ways. In terms of new foods, medicines, industrial materials and energy sources, we have barely made a start on exploring the most abundant and diversified stock of natural resources on the planet.

Let us applaud a book, then, by two of the world's best ethnobotanists. They have produced a book packed with the latest information and analyses. It is elegantly written and excellently illustrated, and it is also great value.

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The Charcoal Dilemma: Finding a Sustainable Solution for Brazilian Industry

BY F. ROSILLO-CALLE, M.A.A. DE REZENDE, P. FURTADO & D.O. HALL

xv 1 79 pp., 3 figs, 14 tables, ISBN 1 85339 322 3 paperback, £8.95, 103–5 Southampton Row, London, UK: Intermediate Technology Publications, 1996

Brazil has extensive, easily-exploited deposits of iron ore and substantial forest resources, but unfortunately little coal. Yet although the country is a world leader in the use of renewable energy, the application of its forest for charcoal production for iron smelting is a very controversial strategy. Thus the use of charcoal has many social and environmental implications, and the production of charcoal from 'native' forest, to provide bioenergy for smelting, is viewed with concern. Coke is the commonly recognized cheaper alternative, especially if considered in the short term.

This small paperback volume presents a well-reasoned study of the technique involved in this use of coke, applied on the basis of a nascent strategy of sustainability. It is a neat summary, based on the authors' personal experience of the situation in Brazil, and *inter alia* listing the pros and cons of current technology of the use of charcoal for smelting. The topic has a respectable antiquity, and the four authors do not hesitate to identify the problems, or try to minimize them.

The arguments are backed by plentiful tables and an appendix relating to the Brazilian situation, as well as mass balance, energy density and economic features of the debate. A further appendix deals succinctly with 'Some Problems with Measuring Wood and Charcoal'. These provide an agenda for those investigating the subject in other parts of the world, and are supported by a broad-coverage bibliography of 80 items.

Attention to the environmental impact is important to the future of the industry. The authors identify various environmental constraints, but point out (sic) that 'the main responsibility for large-scale deforestation has not been the charcoal industry, but the expansion of agricultural and grazing land'. Nevertheless, they express concern over the development of eucalyptus plantations as a source of charcoal, invoking the expression 'prisoners of Eucalyptus'.

I would bring the reader's attention to the authors' view that '. . . in general the environmental impacts of Eucalyptus plantations are no better or worse than *other similar species*' (my italics). They add 'Any environmental impact is more a consequence of the particular forestry techniques used than [of] the tree species *per se*', and argue that there is very little scientific evidence to support the idea that *Eucalyptus* spp. contaminate the soil, drain it dry, and thrive at the expense of other plants in the vicinity. There may be a paucity of research on this topic, but many biologists would disagree with the idea of currently giving eucalyptus a clean bill of health on these scores!

In practice, from my observations on my travels in various parts of the globe, 'sustainability' of tropical forest is more honoured in the breach than in the observance. The statistics from Latin America on net loss of forest are depressing; Brazil itself being no exception. I would also question the concept of 'similar' when applied to comparing other plantations with eucalyptus. The eucalypts form a very distinct group and are thus only acceptable to a highly specialized fauna. Apparently the Brazilian authorities recognize this fact, interplanting the plantations with species from other genera and leaving about a third of the plantation area to natural regeneration. However, conclusions from the study of the effectiveness of this type of process in other parts of the world are not encouraging.

The products of the destructive distillation of wood have been important in the past, but they are largely uncompetitive when compared with a similar range of distillates from the oil industry. The authors recognize this problem, and accordingly treat the technology with caution in their consideration *inter alia* of its by-products to the overall economy of charcoal production.

This account of the charcoal dilemma, as its affects Brazil, is a balanced summary of the situation in that major country. It raises issues of relevance to many other afforested areas, or formerly afforested areas, of the tropical world. The report itself makes the suggestion in its closing sentence: 'The industry itself must also

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consider other raw materials for charcoal production, such as sugarcane bagasse, straw and babassu shells'. Equivalent residues are to be found in other parts of the tropical world. The text is recommended reading for all concerned with the sustaining and economic use of the globally fast-disappearing tropical forests.

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Holocene Cycles, Climate, Sea-level, and Sedimentology

EDITED BY CHARLES W. FINKL, JR

(A Jubilee Volume in celebration of the 80th birthday of Rhodes W. Fairbridge.) xii + 402 pp., illustr., index, bibliogr., 28.4 × 21.5 × 2.6 cm, ISBN 0 935 868 78 X hardcover, no price indicated, Coastal Education and Research Foundation & the Journal of Coastal Research, Ft Lauderdale, Florida, USA, 1995

The four parts of this volume are entitled, respectively, 'Climate, Proxies and Chronology', 'Holocene and late Pleistocene Eustasy and Climate', 'Sea-level, Neotectonics and Tectonoeustasy' and 'Solar, Semi-solar and Planet Cycles'. Fifty collaborators contributed 49 chapters to it, 17 of them belonging in Part B. The editor provides a rather brief introduction. A 10-page bibliography by Sanders and Fairbridge is actually condensed from a more detailed book, but then each chapter has its own reference list as well.

The book should be read, and consulted, usefully by environment specialists interested in the overall problem of climatic changes and sea-level modifications; this is particularly so as they relate e.g., to beach erosion, to El Niño events, to sea-level changes in the recent geological past and their recent history in Korea, the Chukchi Sea, the Baltic, the southeastern USA, to sandy beaches as records of changes in relation to sea-level and storm frequency, to river response to rising sea-level, to the relationship of sea-level and climate, and to problems in Maritime Canada, the United Kingdom and elsewhere.

The interesting question 'global warming or little ice-age?' is asked and discussed. The volume does not include a biography of Rhodes Fairbridge, nor has it a wrap-up chapter – which is probably understandable in view of the wide range of its topics and areas.

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Marine Benthic Vegetation: Recent Changes and the Effects of Eutrophication

EDITED BY WINFRIED SCHRAMM & P.H. NIENHUIS

xix + 470 pp., 134 figs, 44 tables, 24 × 15.7 × 2.2 cm, ISBN 3 540 58106 5 hardcover, DM 198, £92.50, FF 746, öS 1445.40, sFr 173, (Ecological Studies No. 123), Heidelberg, Germany: Springer Verlag, 1996

This book is the outcome of a joint effort by members of the former COST-48 and BRIDGE programmes of the European Commission. Though practically unrelated to a previous volume on *Seaweed Resources of Europe* (reviewed in *Environmental Conservation* 21(2): 192, 1994), several of the authors contributed to both volumes. The carefully prepared text includes a general part which describes the phenomenon of eutrophication and examines possible management, followed by specific aspects and case-studies.

This volume provides a rich bibliography with each of its chapters, though the indexes are unfortunately incomplete and the subject-list is furthermore short. The illustrations are of exceptional quality though additional photographs seem desirable. Maps and line drawings are numerous, though a phytogeographer would have welcomed more location maps.

Increasing amounts of various types of wastes and pollutants, including nutrients, enter the coastal waters via rivers, direct discharges from land-drainage systems, diffuse land-runoff, dumping, and via the atmosphere. This has led to coastal eutrophication and, in extreme cases, to hypertrophication. Until recently, coastal eutrophication and the resulting effects on marine macrophytes were mainly treated as local, short-term problems. However, the local nearshore problems developed into overall coastal and inshore phenomena, and recently we have been facing coastal eutrophication problems on a global scale.

This book is probably the first comprehensive document, systematically covering the entire coastline of Europe, on the effects of eutrophication on the marine benthic vegetation. It is of value to all environmental researchers.

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Proceedings of the Tsukuba Global Carbon Cycle Workshop (Global Environment Tsukuba '95)

BY CENTER FOR GLOBAL ENVIRONMENTAL RESEARCH

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Following the inauspicious start of a typographic error in the first word on the title page, this 174 page A4-format Proceedings of a Workshop on Global Carbon Cycle could only improve! That the volume was likely to improve was evident by a cursory glance at the contents pages. There, names of a number of experts in the field of the global carbon cycle were identified as contributors. The volume reports the proceedings of a Conference held at Tsukuba, Japan, in February 1995 under the auspices of a number of Japanese Research and Environmental Agencies. The aim of the workshop was to bring together leading scientists engaged in the modelling and observation of the global carbon cycle, to provide a synthesis and to inform future research plans. The Proceedings indicate that these aims were achieved, at least in part.

The first section of the Proceedings comprises a written account of the discussion session held at the end of the workshop and provides a summary of the technical papers that follow. It is here that the elements relating to the third aim of the workshop are to be found, i.e. suggestions for future research. It seems that the major conclusion from the sessions was the identification of the need for

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more data. Whilst this might well be the case, it would be stimulating to occasionally read about more adventurous suggestions emanating from workshops like these. However, to be fair, other conclusions were identified. For example, the summary in the Oceans session identified the valuable work now being done on tracers, such as the man-made chlorofluorocarbons to illuminate ocean-mixing processes and their role in the carbon cycle. And in the Terrestrial session, quantifying the multifarious interactions between nutrient and water availability (in a changing climate) plant growth and increasing atmospheric CO_2 was identified as an important research need. I was also somewhat amused to read in the report on the Atmospheric session that 'The participants encouraged Dr [Pieter] Tans to move from a 2D atmospheric model to a 3D model'. I would have like to have witnessed the form of the 'encouragement'!

This opening section concludes with reporting the 'general agreement' that the Proceedings should be published with some peer review 'of the contained papers'. Presumably this volume is that publication. However, apart from a statement that the 'report was compiled under the review of the Editing Committee' (the names of five committee members are provided) there is no further indication of how the final written contributions were arrived at.

The remainder of the Proceedings comprise the technical papers grouped into four sections: Global Modelling: Atmospheric; Oceanic; and Terrestrial.

The Global Modelling section (three papers) opens excellently with a short summary of the IPCC view of the carbon cycle by Wigley. This is one of the best short summaries I have come across, and in the space of only a few lines illustrated the misnomer of the 'missing sink' of carbon. The Global Modelling section is completed by two short summaries of models – one concerning simple carbon models and the second a global biospheric model. Both are good introductions and 'tasters' for anybody interested in further in-depth study.

The second section concerning the carbon cycle in the atmosphere (three papers) again opens strongly with a paper by Tans who details the possibilities of an extensive global carbon observing system. He argues that the best way forward is a more extensive 'flask' sampling programme based around a wider aircraft and land-based (tower) network than hitherto. He is clearly not in the 'camp' that sees satellite remote-sensing as a panacea. The next paper in this section (Taguchi and Hayashi) is a short summary of a three-dimensional transport model developed at the National Institute for Resources and Environment, Ibaraki, Japan. Their simulations seem to confirm the majority of other recent models, namely unresolved sinks for CO_2 in the northern hemisphere, both terrestrial and oceanic (North Atlantic). The final paper (Schnell) is a 'data-rich' contribution detailing the marked variability (hourly) in the origins of air masses arriving even at remote sites such as Mauna Loa and how this markedly influences measurements of carbon cycle species.

The third section devoted to oceans, is the largest with eight contributions, although two are little more than one-page abstracts. Excluding these, the section has something for all marine (bio)geochemists: models, carbon isotopes, the role of coastal waters as sources (sinks) for anthropogenic CO_2 hypotheses about the role of the ocean in maintaining low atmospheric CO_2 during the most recent glacial. Highlights for me were the papers by Wong, who provided mass balance calculations of the oceanic biological and solubility pump sinks, and Nozaki and Oba, who gave a simple explanation of the alkalinity pump. Together these papers would provide a good introduction and summary for students of marine biogeochemistry. The latter paper was interesting in that details were given of a semi-quantitative *in situ* experiment on dissolution of calcite and aragonite at depths to nearly 9 km. I have not seen this work published elsewhere.

The final section, comprising seven papers concerning the terrestrial ecosystem, contains a mixture of modelling, mass balance and data papers. All the papers in this section make at least a passing reference to the 'missing sink' and the role of the terrestrial biosphere. The majority of the papers are short summaries of work that might be found in detail elsewhere. However, the exception to this is the contribution by Scharpenseel and Pfeiffer (Hamburg) who provide a very comprehensive review of the global carbon cycle (with an emphasis on soils) from the Hadean ($4.6–3.7 \times 10^9$ years BP!) to the present day. I continue to find this to be a valuable source of global budget data for many components of the carbon cycle; it is also supported by a comprehensive and up-to-date collection of 65 references.

All in all this is a interesting volume to 'dip into'. The value of the contributions range from not particularly useful to highly so. However, I could not help but be constantly comparing this volume with the IPCC documentation. To be fair, this publication was never intended to 'compete' with the IPCC documents, but much of what I found valuable in this is better dealt with by the IPCC. Nevertheless, this volume achieves its aims at summarizing what appears to have been a very valuable workshop. I doubt, however, whether any of the papers in the Proceedings will be come 'citation classics'.

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