

BOOK REVIEWS

The Living Planet in Crisis: Biodiversity Science and Policy

EDITED BY JOEL CRACRAFT AND FRANCESCA T. GRIFO

xxiv + 311 pp., 25.4 × 17.7 × 1.8 cm, ISBN 0 231 10864 8
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US\$28.50, New York, USA: Columbia University Press, 1999

The scope of this book was somewhat unclear to me. First of all I was confused by the front cover, where the subtitle 'Biodiversity Science and Policy' is written (albeit with smaller letters) between the two lines which constitute the title ('The Living Planet' and 'in Crisis'). So I wondered whether the book was about the crisis of the planet, or of science. The book grew out of a conference at the American Museum of Natural History in 1995. Unfortunately, the four years which passed until it was published are a terribly long period of time in a field where new ideas appear and mature at a very fast rate. As a simple consequence of this time lag, the book can hardly be taken as a 'state of the art' review.

The book is an interesting mixture of 12 review papers and several short essays, or 'perspectives'. The presentations are quite heterogeneous: some have an abstract, others do not; some are heuristic with simple graphs, while others include original analyses and documentary data. Also the amount of literature review varies greatly. The first half of the book tells what we know today about the magnitude of biodiversity and its decline. Then follow reviews of what biodiversity loss may mean for future societies. The third part revolves around policy issues and the Convention on Biological Diversity (CBD). Finally, three short essays explore how scientific knowledge and uncertainties about the loss of biodiversity may lead to inadequate political response.

Fourteen of the authors live in the USA, four in the UK and two in Italy; while three are currently based in Switzerland (IUCN) and Australia. This bias seems to affect the attitudes, especially when 'our value systems' are discussed. It also means that some important research areas are unrepresented, such as optimal area-selection for conservation, which already emerged in the late 1980s in Australia, South Africa and the UK.

The first part of the book starts with a review by Nigel Stork of the ongoing effort to estimate the magnitude of global biodiversity, starting with quite unrealistic extrapolations that were formulated in the 1980s. This is a fine review of the empirical evidence and the methods used. However, it overlooks the important analysis by Tom Fenchel (1993) which, based on considerations of community structure and absolute population sizes, argued that there is no reason to believe that the number of microscopic organisms is particularly large.

Norman Platnick reviews the current status of research in arachnids. He estimates that it will take another 683 years to describe all kinds of spiders. He correctly points out that the 'all taxa biodiversity inventory' approach suggested by Dan Janzen is meaningless because of the enormous variation in biodiversity between sites.

Melanie Stiassny describes, with some shocking examples, the crises of the freshwater ecosystems of the world. Also here, the aim seems to be to illustrate the pressing need to survey freshwater biodiversity more fully. Unfortunately, several bulky reviews of African fish faunas, published during the 1990s by the Royal Central African Museum of Tervuren, have been overlooked.

Ross MacPhee and Clare Fleming review 500 years of mammal extinctions. Their estimate of the extinction rate agrees fairly well with those made by the IUCN but the paper illustrates that a large number of taxonomic questions must be solved to produce a correct list. For instance, the quagga is not accepted as an extinct species, as the authors regard it as a subspecies of the extant *Equus burchelli*. It is surprising to see that only a very few large mammals became extinct during the past 500 years, compared with the extinctions at the end of the Pleistocene.

All papers in this section seem to indicate that conservation is stuck in a blind alley as long as we do not have the resources that are needed for a complete global biodiversity inventory. Thus Platnick complains that 'we can abandon all hope of learning enough to do anything more than guess at a worldwide diversity pattern in our lifetime'. The authors do not consider the alternative approach of using data for well-known groups to analyse general trends in species richness variation, and provide robust tests of congruence between groups, and of the performance of proxy data. The question remains as to how efficiently management decisions based on 'flagship' taxa cover a range of other taxa. Neither does the discussion by Platnick consider how stochastic variation on a fine scale usually translates into a high level of uniformity and predictability on larger scales (Wiens 1989).

In the second section, Joel Cracraft analyses extinction risks in the tropics. Country by country, he compares species diversity indices (relative ranks of higher plants, butterflies, land birds and mammals), biodiversity threat indices (relative ranks of land conversion) and capacity response indices (capacity to respond to environmental problems). The perspectives of this approach are difficult to understand. First of all it ignores processes. Despite the high land conversion and low capacity in the Sahel countries of Africa (considered high priority), extinction risks are low, because of the general resilience of biological communities which inhabit regions which are inherently unstable. This is illustrated by the rapid vegetation regeneration since the alleged expansion of the Sahara in the 1970s and 1980s. Another problem is whether approaches to rank nations are politically useful. Because of worries by some nations over the focus on 'megadiversity countries' ten years ago, any discussion about this kind of ranking was removed from the CBD. He also seems to have overlooked the progress that has been made with other, more fine-grained studies using other algorithms, which define priority areas much more precisely (see for instance the book *Conservation in a Changing World*).

Chapters by John Burnett, Francisca T. Grifo, Eric Chivian, Arthur H. Westing, D. Moran, D. Pearce and D. Pimentel review and exemplify the consequences of biodiversity loss for agriculture, human health, security and economic development. These are all good general reviews which state the limitations caused by our incomplete knowledge about the world's biodiversity.

The 'political commentaries' represent, together with E.O. Wilson's foreword describing the state of the world, some very interesting reading. However, some authors may underestimate the amount of variation in perceptions, convictions and rationalities that exist outside the USA, even between developed countries. Peter Raven and Joel Cracraft admit, though, that despite the amalgam of

cultures in the USA, this is one of the least internationally-oriented countries. The political acceptance of support for 'global biodiversity' is quite different here and in other nations where the international aid for development was increased by up to 0.5% of the GNP in order to follow up on the CBD.

The book clearly revolves around the vision of Systematic Agenda 2000, which asked for support for a complete inventory of global biodiversity. However, it does not analyse the question as to why this attempt failed. I do not think that the lack of response is due to lack of concern about the 'planet in crisis'. It is rather that laymen and politicians (and even some biologists) do not buy the argument that complete inventories of global biodiversity are needed. They think that first of all we need the wisdom to apply knowledge that already exists. Carleton Ray's comments that '... if we can change our paradigm from "things" to higher-order patterns or process, from stasis to dynamics ... then perhaps we can save biological diversity and, ultimately ourselves.' The key to funding (following the CBD), is transfer of technology, access to data, and willingness to share rights and benefits. Indirectly, this may also boost taxonomic research, although not so much the current research centres.

Jeff McNeely points out what most biologists seem to forget, namely that policy change is designed to provide benefits to constituents, not constraints. What this means is that we have to become better at 'packaging' our agenda, so that they can be achieved as side effects of efforts which are already included in the portfolio for sustainable development. It seems now (March 2000) that, after biologists shifted their focus towards access to biodiversity information, there will be massive international funding for a Global Biodiversity Information Facility.

References

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Imposing Wilderness: Struggles over Livelihood and Nature Preservation in Africa

BY RODERICK P. NEUMANN

256 pp., 12 figs., 7 maps, 4 tables, 23.5 × 16 × 2.5 cm, ISBN 0 520 21178 2 hardback, US\$35.00, Berkeley, California: University of California Press, 1998

The book presents an historical overview of the Meru people's access to land and cultural rights in the Arusha National Park in Tanzania. The author reviews the effects of various colonial regimes on land-use in the region, and the ever-decreasing access to land by the local people. He presents the claims to both cultural and economic rights of the Meru, their position in the resulting conflicts over

access to resources and land, and the impact their political position has had on conservation and government administration.

Students and people interested in conservation, history, anthropology and politics in Africa will find this book useful as a well-researched documentation of the conflict between land workers and government over natural resources. The book can help inform natural resource management, conservation and development policy and approaches. It could also provide useful insight into problem identification and conflict resolution between local populations (small farmers) and government/international organizations.

The author presents a well thought through and well researched argument and perspective for local claims to land, patterns of inequity and historical and current conflicts. The author's perspective is clearly focused on local users, local economies and land rights and cultural and social customs. There is a lack of balance, however, in the arguments presented, as they appear in isolation from other perspectives and justifications for the government's/conservationists' position. In the specific case of the Arusha National Park, the author has researched the history and arguments for both the conservation perspective and the local people's perspective. Although presented from a slightly extreme perspective (Garden of Eden and focused purely on consumption by foreign tourists), the author presents a strong argument for considering the needs and requests of the local populations. In generalizing to conservation approaches throughout Africa, however, there is no evidence that the author has researched current arguments and justifications for government control of land-use, and the ecological and economic benefits of protected areas. Only the historical (colonial) arguments for conservation and protected areas are presented. These arguments have changed, however, and conservation thinking has radically changed since the beginning of the last century. The reasons that many protected areas were established are not necessarily the same as the reasons for which they are being maintained. The challenge is to apply this paradigm shift in current management practices. The author has failed to present both sides of this conflict in an impartial manner. This weakness notwithstanding, the author has provided a great deal of useful information and an interesting perspective, which should contribute to realizing this change in objectives for conservation. The concept of the 'moral community' in the perspective of the local people, as well as their definitions of criminality and justice are important in helping define and develop approaches to link conservation with local livelihoods.

The presentation and analysis of the origins of conflict between the Meru people around the Arusha National Park, and the park and protected area management authorities, as well as the urge to integrate the needs of both, should help inform policy and approaches to community-based conservation. Integrating the needs of local people in protected area management is an accepted principle, yet the mechanisms for doing so are not always clearly understood or applied. Neuman's analysis will help ensure that these links are strengthened.

Overall the appearance is attractive. The typeface is easy to read. A few small editorial errors were noted (typographical errors and omissions of words). One example is on page 209, paragraph 3, sentence 2, where 'protected management' instead of 'protected area management' is written.

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Our Common Journey: A Pioneering Approach to Cooperative Environmental Management

BY PAUL E. DE JONGH, WITH SEAN CAPTAIN

xiv + 298 pp., figs. & tables, 21.5 × 13.4 × 1.7 cm, ISBN 1 85649 73 9 paperback, £15.95, London and New York: Zed Books, 1999.

In *Our Common Journey*, de Jongh and Captain promise the reader a new approach to cooperative environmental management by developing an integrated environmental policy framework involving government, the private sector and civil society actors, particularly non-governmental organizations (NGOs). At a more practical level, the book is an overview of the evolution of The Netherlands National Environmental Policy Plan (NEPP) and the twists and turns that were at play in producing one of the world's pioneering experiences with negotiated integrated environmental management. De Jongh, the leading author, brings the full thrust of his 20 years' experience as the project leader of the Netherlands' first NEPP and Deputy Director-General for Environment. In this sense the book contains an insider account of the Netherlands' national environmental policy and how it has been able to integrate divergent interests of various stakeholders. However, the authors (p. 6) argue that, although the book is concerned mainly with the Netherlands, it has much wider relevance to countries with similar environmental history, context, institutions and problems.

The book is divided into 14 short chapters. Chapters 1 & 2 set the scene. Here the authors give a brief account of the evolution of the Netherlands' environmental policy and the beginning of environmental awareness. Chapter 1 introduces the five pillars of the Netherlands' cooperative environmental management strategy (p. 7) as follows: (1) integrating environmental responsibilities into society as a whole; (2) presenting clear information, understandable and acceptable to all parties; (3) recognizing policy as process, in which many actors play critical roles; (4) framing the policy debate in terms acceptable to all participants and (5) working for long-term continuity policies.

The rest of the book represents a genuine effort by the authors to illustrate whether or not the ethos of the Netherlands' environmental policy principles has been put into practice and to what extent the policy has succeeded in delivering its promises.

Chapters 3–6 describe the environmental policy process leading to strategy building. This is a familiar method of narrating the cycle of environmental strategies, particularly the first phase, including information assembly and analysis, policy formulation and the design of action planning. Two features unique to the Netherlands experience are the concepts of 'each generation's responsibility' (pp. 79–81) and 'integrated chain management' (pp. 84–8). Although the NEPP did not start with involving what the authors call 'the wider audience' (i.e. the public) from the beginning, research and information played an important role in (1) gauging the public interest and (2) maintaining both horizontal and vertical information flow. The integration of the public concern was carried out through 'immediate actions' informed by the National Health and Environmental Research Institute's (RIVM) three feedback mechanisms. These mechanisms are: (1) research to generate follow-up reports and economic studies, (2) subsequent action resulting in new generations of National Environmental Policy Plans and (3) contingency plans for monitoring progress and preparing better plans for the future.

Chapters 7–10 deal with various levels of environmental policy harmonization, 'institutional politics' and the difficulties that have emerged between various stakeholders both at the state institutional

(Government Ministries and Departments) levels on the one hand and private and public interests on the other. As the various stakeholders realized that they could not go it alone, they began a shift as the authors state 'from fighting to managing the process'. Although consensus building was achieved, not without confrontations, there was a need for moving from principles to actions, with clear instruments and strong institutions, both operating within a national legal instrument. The continuity (or rather the sustainability) of the Netherlands NEPP was secured by a process that has culminated in creating roles and a common interest in the environment.

The title of the book, *Our Common Journey*, is probably depicted from the material presented in Chapters 11–13, which illustrate how the Netherlands NEPP has influenced, and been influenced by, international environmental policy orientation, and the environmental policies of the European Union, Australia, Canada and New Zealand. In a sense, the title of the book ameliorates *Our Common Future* (a 1987 publication of the World Conference on Environment and Development and Oxford University Press), but concentrates more on national rather than global environmental policies, although the two cannot be disentangled. This is evident in Chapter 14, which grapples with five global challenges (biodiversity and nature protection, population, migration and distribution of wealth, eco-efficiency, water supply and climate change). An attempt is made here to illustrate that the quest for global cooperative environmental management represents a common human journey, a common human future.

Although the book offers an excellent description of the evolution of the Netherlands NEPP, it runs short of producing strong evidence that these policies have actually worked. The reader would have benefited from a chapter on targets set and targets met since the inception of the policies. The authors are also up-beat, presenting the Netherlands NEPP as a pioneer trendsetter in strategy building and implementation. Some authors may beg to disagree. Nevertheless, this criticism would not lessen the significance of this book and a major contribution to understanding the socio-political and economic context within which at least three generations of the Netherlands NEPP have been conceived and implemented.

Our Common Journey is a very well-written book, with excellent first hand material and graphic illustrations to back up the arguments raised. It is written in a very accessible language, yet professionally done. It is a must read for students of environmental policy, researchers, policy makers, the general and particularly the 'green public'. The book also provides an unique insight that is helpful also for environmental activists in their struggle for better environmental governance worldwide.

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The Hydraulics of Open Channel Flow. An Introduction

BY HUBERT CHANSON

xiv + 495 pp., 24.4 × 17.2 × 3.0 cm, ISBN 0 340 74067 1 paperback, £29.99, London, UK: Arnold, 1999

It is a sign of the times when a book with the above title is offered for review in a journal such as this. Thus, my review must necess-

arily evaluate the text both for the author's intended audience (students in Civil, Environmental and Hydraulic Engineering) as well as an altogether different one, namely that concerned with the interface between engineering and environmental science. This is an audience membership of which is growing, and where practitioners may require a basic grounding in open channel hydraulics, having not followed a traditional route through an engineering degree.

Without a doubt, this is the best introduction to the hydraulics of open channel flow that I have yet to read. The text is divided into four parts. The first two deal with principles of open channel flow and sediment transport, respectively. The second two address practice, including hydraulic modelling (both physical and numerical) and the design of hydraulic structures. The pace of the book is right, using basic principles to introduce fundamental relationships, and then illustrating their use through worked examples. The pace benefits from revision exercises and the repetition of variable definitions as they are re-used; from my experience, this really helps students during the learning process. The text deserves special credit for the explicit identification of the assumptions that exist behind relationships, something that can be (and is) easily overlooked by students whilst using other texts. The book's revision exercises have solutions provided for them, care of the publisher's website, and this provides a clear incentive for the student to solve, before they revert to finding out how they should have solved, each exercise. As an introduction to the hydraulics of open channel flow, I would find it difficult to recommend anything that could improve upon the approach adopted.

In a text with this title, coverage is a more difficult issue, requiring a very careful balancing of breadth with depth. The depth was pretty much spot-on, aside from the need to include more references for the advanced student, to allow them to explore the more subtle and esoteric aspects of open channels which can often be necessary to bridge the gap between practical river-channel management and research questions in hydraulics. The breadth could, perhaps, have been extended to include consideration of mixing and dispersion, with respect to dissolved loads. Mixing processes are of increased importance to the river engineer, because of both growing environmental emphasis and the way in which many tools, notably numerical models, have been extended to include water-quality treatments. Indeed, there are a set of water-quality models in widespread use which have a notoriously poor hydraulic basis. A water-quality section, that links water quality to hydraulics in the same highly effective way that the author links sediment transport to hydraulics, could be very useful, such that the student can judge the full limitations, assumptions and benefits of the tools that they are adopting in the water-quality area as well. In terms of the author's intended audience, I am certain that this text will prove sufficiently popular to warrant many reprints, and the author might like to look towards possible revisions with this in mind.

Judging this text in terms of its suitability to a non-engineering audience, one concerned with, for example, the ecological dimension of river channel management, my conclusions are more sober. As a book for the non-expert, it holds many of the advantages identified for engineering students. It is useful for moving from minimum or zero knowledge to a reasonable level of understanding, provided that the reader spends time working through the exercises. The grounding in basic principles and the exposition of key assumptions is critical. However, I found myself wondering whether or not this book really does any more than provide an excellent grounding for river engineers in the same way that aquatic ecology texts might

provide the basis for river ecologists? The average ecologist would pale at the section of the book concerned with the design of hydraulic structures, if only because the design of hydraulic structures is now about so much more than dams, weirs, spillways and culverts. The growth of river and floodplain restoration is causing new questions to be asked of hydraulic engineering, with new management goals (e.g. that of maintaining sufficient overbank flows for floodplain vegetation rather than keeping flows within the channel *per se*) beginning to complicate traditional solutions of the relationship between fluid flow and a deformable boundary. These are interesting (and sometimes awkward) times for the engineer, as the traditional management of rivers based upon equilibrium and the design of a system that is adjusted to the things that are likely to be imposed upon it, must be extended to incorporate ecological concerns which are driven by the need for disturbance and hence disequilibrium. It is at the interface between engineering and ecology that new research questions lie. A text that moves beyond traditional civil engineering approaches and into the ecological arena is desperately required if only to prevent the sort of contradictions that arise when a river engineer works with an in-stream ecologist. It is not simply the lack of any reference in the index to vegetation that raises my concern, but also the paucity of treatment of natural or self-formed alluvial channels. It is real river channels that the engineer must now manage, for ecological reasons in addition to those associated with the conveyance of water and sediment. It is the dynamic behaviour of such channels that the ecologist must understand, in recognition that a river cannot always be managed for ecological reasons alone. I fear that an ecologist without a basic understanding of the context of open channel flow research (and hence an awareness of the need to understand basic principles) could simply conclude, from this text, that the gulf between engineering and ecology is simply too great to be bridged.

The above paragraph is critical of this text only because of the journal for which the review is being provided. As a resource for those concerned with environmental conservation in open channels, I am less persuaded. Indeed, the author's preface to the book does not include this as a goal. Thus, it would be wrong to finish on a sombre note, as my overwhelming conclusion is that as an introduction to the hydraulics of open channel flow, it would be impossible to produce a better result. This will appear on both my undergraduate and postgraduate reading lists as the core text. It is rare for me to be so readily persuaded, and Dr Chanson deserves full credit for an outstanding teaching resource.

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The Basin of Mexico: Critical Environmental Issues and Sustainability

BY EXEQUIEL EZCURRA, MARISA MAZARI-HIRIART, IRENE PISANTY AND ADRIÁN GUILLERMO AGUILAR

xix + 216 pp., 43 tables, 35 figs., 23.5 × 15.5 × 1.5 cm, ISBN 92 808 1021 9 paperback, US\$24.95, Tokyo, Japan: United Nations University Press, 1999

This little book is a welcome addition to the unfortunately sparse published material on environmental quality and problems in

Mexico and Mexico City. The book is well written, well organized, clear and concise, and a useful addition to anyone concerned with the state of the region's ecology and environment. It is a highly readable review of both the environmental history and relatively current condition of the Mexico City basin. It is largely non-technical and therefore is easily accessible to a broad readership. The text is liberally and usefully supplied with old and new maps of the region in terms of various environmental characteristics, the contribution of the geographer on this project.

The eight chapters review the environmental history of the basin, current socio-economic conditions, recent environmental changes, the forces behind the changes, current environmental vulnerabilities and official responses to the problem. Unfortunately, as anyone who has lived in the basin knows, there are still no signs of optimism that the environmental problems there are being properly tackled, and the authors share that view.

As the series editors point out in the preface to this volume, there is only one other place in the world more environmentally at risk than Mexico City, and that is the Aral Sea basin, a case of dramatic environmental damage and decline. So this little book is timely.

Chapter 1, 'The environmental history of the Basin' briefly reviews what is known of the ecological and environmental conditions of the basin from pre-Columbian times, through the European conquest, colonial period and the revolution. Control of water has always been central to the environmental and economic condition of the region, and the authors explain the history and technology of the *chinampa* system of agriculture instituted by the indigenous tribes. They describe the ecologically very negative effects of the draining of the many lakes that once covered much of the valley, and the effects of excessive extractions of groundwater. Chapter 2, 'The socio-economy of the Basin of Mexico' describes modern demographic and economic growth patterns in the basin, analysing the demographic and spatial expansion of the area into ecologically sensitive areas. Many data are presented on the dimensions of this expansion.

The remaining five chapters of the book are focused on various environmental problems of the basin resulting from its demographic and economic expansion; much attention is paid to the problems of water quality and quantity, and air quality. The authors are aware that the problems of the basin are very much the product of an economy that has paid little attention (as everywhere) to the externalities of production and consumption activities. The basic drivers of the degradation have been population growth, lack of controls on emission and effluent services, and a pervasive subsidy of basic services in the basin, prominently amongst them domestic and industrial uses of water. The effects of continued groundwater extraction, importation of water from watersheds outside of the valley, and problems associated with discharges of untreated sewage to the Tula River basin, are fully described.

The remainder of this book focuses on the delayed governmental responses to these problems, and chronicles the recent history of different governmental institutions that have attempted to deal with the environmental difficulties. The authors also discuss the roles of non-governmental organizations (NGOs) in forcing a more determined governmental response to the growing environmental problems.

Anyone who has lived and worked in Mexico understands that the many environmental difficulties, both in the valley of Mexico and elsewhere in the country, are closely linked to the general inefficiency of government, and despite the substantial efforts of many dedicated and resourceful individuals, the relatively weak civic society in general. Governmental inefficiency and corruption are in large part

derivative from the uncompetitive political system that has characterized Mexico since the revolution (actually, since the conquest), and so make the government unresponsive to these kinds of problems. In fact, the long-standing governmental response to criticism has been to co-opt critics by finding some way to channel financial support to them, thus buying their silence. The policy has been very effective in dampening public expressions of dissent, but from the point of view of improving the environment, a disaster, for it is clear everywhere the central role that civic society plays in environmental improvement.

As important and not mentioned by the authors have been the continuing series of economic crises that have characterized Mexico for nearly the last twenty years, greatly reducing governmental finances and support for the various environmental agencies. Budget and personnel restrictions have been a constant and unfortunate reality.

Still another factor that is difficult to overemphasize is the fact that Mexico still dedicates a very inadequate per cent of its national resources to education in general, and to higher education in particular. As a result, while the qualifications of officials at the very top are usually very good, the educational depth of governmental staffing is very insufficient for its needs, and this explains part of the country's problem in forging adequate governmental responses to its environmental problems. The case of 'Hoy No Circula' (it isn't driven today), the vehicle control programme for attenuating Mexico City's terrible air pollution problem, is a striking example of a totally perverse policy. Outside observers note that anyone with a good understanding of introductory economics could have easily predicted that it would fail, and why.

The authors are not optimistic that the basin's environmental problems are going to lessen anytime soon, and unfortunately, it is easy to share their pessimism that the downward ecological spiral of the basin will continue. The idea that the basin's problems derive fundamentally from distorted market mechanisms and governmental subsidies still has not gained much currency in top environmental circles in Mexico nor amongst the active environmentalist community. It will be the case there, as elsewhere, that these problems will not be effectively countered until this recognition occurs and mechanisms are devised and put in place to eliminate the market distortions. The first of these will start with realistic pricing for water and for market-based mechanisms to ration access to the airshed as a place to dump combustion residuals.

In sum, this is a good and timely little book, and 'must' reading for anyone with a serious interest in the environmental problems of the Mexico City area.

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International Toxic Risk Management: Ideals, Interests and Implementations

BY AYSLEY KELLOW

xii + 222 pp., 2 tables, 23 × 15 × 1.7 cm (pb) ISBN 0 521 65257 X hardback £37.50/US\$64.95, ISBN 0 521 65469 6 paperback, £13.95/US\$22.95, Cambridge, UK; Cambridge University Press, 1999

This book addresses the complex subject of the global regulation of toxic chemicals and provides a useful chronology of evolution of their international governance. The ‘combatants’ are described and then the subject of risk and policy towards toxic chemicals at the national and international levels introduced. Subjectivity, risk perception and risk management are all discussed. The advantages that industry has at the national level are compared with the strengths the environmental lobby enjoys in international fora. Then the Basel Convention is dissected and examined in detail. Risk reduction programmes under the OECD are discussed in the context of heavy metal pollution. More abstract matters, including scientific rationalism and moral suasion are brought forward in the conclusion. The book will be of interest to the chemical industry, environmental policymakers, environmental NGOs and environmentally aware members of society. It is written at a level which will be accessible from an undergraduate level upwards.

Aynsley Kellow is Professor of Government at the University of Tasmania and has that refreshing lack of candour associated with the Antipodes. In the preface, he recounts that in his career he has moved from medical school dropout to political scientist, via a period as a Greenpeace activist. He now finds himself writing a book which is highly critical of Greenpeace and demanding more effective industrial representation in international policy-making. There are two main messages to be gained from the first chapter, firstly that there is a wide gap between policy adoption and policy implementation and, secondly, that this is because NGOs and environmentalists tend to prevail in international fora while industrial concerns have more success in blocking initiatives in the domestic arena. This latter point is made somewhat repetitively, in fact no less than three times.

It is this early part of the book about which I have most misgivings and disagreements. It is clear that while sitting on many committees over many years, some of the hoary old chestnuts put around by chemical industries have rubbed off on the author. For example, on page nine he attacks the Greenpeace ‘Chlorine Campaign’ which, while intended to attack the production of organo-chlorines such as PVC, was ‘oversimplified’ by attacking instead chlorine. He states ‘we assume that common salt – sodium chloride – was not targeted in the campaign’. This misses the fundamental point that PVC production is directly tied to elemental chlorine gas production, which then in turn leads to persistent organic pollutants. On the same page, Professor Kellow takes a swipe at Greenpeace scientists, such as Dr Paul Johnson, with the throw-away phrase that their research is politically motivated and ‘not usually subjected to anonymous peer review’. In fact, Johnson and his colleagues hold academic posts in their own right at the University of Exeter and publish in very high quality journals. Furthermore, most of the toxicological scientific data submitted to regulatory bodies for licensing of processes is produced by the very industries which wish to introduce those processes and hardly any of this is subjected to independent peer review. The author does not discuss this subject.

He discusses the ease with which NGOs can claim the moral

high ground without having to address the practicalities of their policies. We are told that the notion of ‘pollution’ itself is culturally dependent. The fact that many environmentalists argue that pollution is morally wrong rather than ‘just a matter of misplaced price signals’ results in environmental issues being problematic for mainstream politics.

In the chapter on ‘Risk, policy and toxic chemicals’, my faith in the author’s objectivity and unbiasedness is further shaken. He reiterates the old mantra that dioxin or TCDD only causes the skin disorder chloracne in humans (p. 19), despite the fact that even the most hard-nosed members of the chlorine industry gave up saying this many years ago. No mention at all is made of a number of published studies which show that a proportion of women in developed countries have body burdens of dioxin-like substances at high enough levels to cause adverse effects to their children’s immune systems and neuro-behavioural development. The story about the predominance of ‘naturally occurring’ dioxins is also brought out of retirement. If the author had referred to the proceedings of any of the annual Dioxin Conferences over the past five years, he would know that such arguments have been completely discredited. He also (p. 30) makes the case that cancer rates in the USA are falling, although it is widely accepted that the lifetime risk of contracting cancer has increased from 1 in 4 in the 1950s to 1 in 3 at the present day. For men, this risk is approaching 1 in 2 and is set in the next decade to become the commonest cause of death. All this is based on age standardized mortalities. Yet again the author chooses a minority view which is generally regarded as being out of date.

In this chapter, Kellow calls for a search for an objective basis for chemical risk assessment. There is no such thing as an environmental free lunch, he says; for example reduction in the use of organic pesticides would lead to increased deforestation because of demand for agricultural land as a result of reduced productivity. He argues that to rely solely on the toxicity of chemicals without taking into account their use to society leads to the politics of blame. Warnings are given, of going from the frying pan into the fire by abandoning the use of chemicals about which there is at least some toxicological information. However, in discussing cost/benefit considerations, it is clear that the author is trained to think predominantly of what is possible, solely in terms of money.

The point is made that ‘Risk professionals are, in other words, being erroneously trained to believe in their own ability to assess risk objectively’ (p. 42). However, this book lacks any in-depth discussion about the difference between risk assessment and hazard assessment. This is a crucial point, for while risk assessment can be applied to well defined problems such as structural failure in engineering, it cannot be realistically applied to complex matters where the hazards are ill-defined or undefinable. In such cases, missing data are replaced with models, and depending on the model chosen, literally any desired result can be achieved. It is surprising how many decision-makers appear not to be aware, when presented with a ‘risk assessment’, that it might be ‘fact free’ and simply someone’s opinion dressed up in pseudo-scientific language. In fact, this is one of the main weapons used to stop the invocation of the precautionary principle, a point that is missing from this text.

From Chapter 3 onward, the book becomes much stronger and informative, as the author increasingly draws on his personal experience as a negotiator at international fora, rather than drawing upon the expertise of others, as was clearly the case when dealing with toxicology. Chapter 3 examines the concepts of ‘pollution havens’ and the ‘industrial-flight hypothesis’ in the context of GATT and

argues that GATT has not led to massive translocation of polluting industries to the Third World. It is argued that to reduce questions of chemical risk to purely scientific elements can lead to flawed policy design. The use of environmental measures to gain trade advantage is discussed.

In Chapter 4, non-governmental organizations of the environmental (ENGOS) and business (BINGOS) varieties are analysed. The myth that BINGOS are better funded than ENGOS is dispelled. The structural dependency of the state on private-sector profitability affects national concerns far more than international organizations and this leads to ENGOS having a degree of influence in the international arena that they tend to lack at the national level.

In Chapter 5, the Basel Convention, which addresses the transnational shipment of toxic wastes, is analysed in detail. The differences of approach of the metals industry (with which the author is closely identified) and chemical industry are detailed. The largely nationally-based metals industries of the world were less able to counter charges of 'toxic colonialism' than the internationally-based chemical companies, and therefore had to resort to lobbying at the national level. It seems likely that the Basel Convention will fail.

The book ends with an excellent review of the OECD Risk Reduction Programme, which once again highlights the tensions between national and international initiatives. This is followed by a concluding chapter which considers international policy implementation and rehearses many of the arguments introduced previously.

On balance, I would recommend this book. The style of writing is excellent and the author is clearly very experienced in the field of international negotiation. This is despite the early chapters addressing the science of environmental toxicology which, in my opinion, are weak because they are somewhat out of date and display a lack of balance. However, given that realization, the remainder of the book gives some fascinating and novel insights into the world of toxic chemical regulation. It is to be hoped that in any future reprinting of this book the author will address some of the points raised.

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Controlling Air Pollution in China. Risk Valuation and the Definition of Environmental Policy

THERESE FENG

xx + 266 pp., 24 × 16 × 3 cm, ISBN 1 84064 100 2 hardback,
£59.95, Cheltenham, UK: Edward Elgar Publishing, 1999

China's future use of its huge coal resources will provide a major challenge to global environmental policy. Additional emission of carbon dioxide as an unavoidable side effect of coal burning is likely to arrive at levels outweighing any abatement efforts taking place in industrialized (Annex I) countries. It is this concern about future atmospheric carbon concentrations which attracts most attention to China's energy policy.

Feng's monograph on air pollution in China adds an additional environmental perspective of coal-based energy. It is shown that adverse impacts from air pollution will impose a significant burden

on the local neighbourhoods of coal-fired plants. In particular, emission of fine particles will have severe consequences for human health. For those interested in a comprehensive view of the environmental dimension of coal utilization in China, Feng's publication provides a valuable source of information.

The book is organized in two parts: Part I (Chapters 2–4) sets up an Integrated Assessment Model. Part II (Chapters 5–8) applies this framework to China's coal-fired power generation plants. An Introduction provides motivation and gives an overview of the modelling approach. Chapter 2 gives a summary of relevant airborne emissions and available abatement technologies. Missing information from Chinese power plants is completed by data from the USA and other sources. Chapter 3 is the most unfamiliar for an economist. It covers plume dispersions, chemical pathways and scumpling processes. A modified Gaussian plume model of regional and local air quality is presented. Chapter 4 describes the valuation process of damages. It comprises a characterization of exposures, concentration-response function and the whole set of economic damage assessment concepts including willingness to pay (WTP) to evaluate human health effects. This chapter provides an excellent overview of economic valuation principles applicable to real world problems. In particular, the Appendix to Chapter 4 offers a comprehensive summary of studies on this topic.

Part II is dedicated to applications. A hypothetical new coal-fired power plant in China serves as a benchmark. A base-case simulation with a cost-minimizing utility reveals fine particles as the major contributor to health risks. Greenhouse gas damages account for another 11 % of damages. Overall external costs are estimated to be US\$43–\$45 million, with human morbidity and mortality as main damages. Local effects are more pronounced than regional or even transboundary ones. Chapter 6 provides a sensitivity analysis. Feng titles this Chapter 'uncertainty', which is misleading since it does not include uncertainty with respect to future developments. Highest sensitivity occurs with respect to population health risks and greenhouse gas damages. Chapter 7 provides a consideration of space, while Chapter 8 focuses on dynamic aspects by means of a partial equilibrium model.

Environmental problems require an interdisciplinary approach. Feng's monograph belongs to the group of rare publications where this demand is successfully met. It is one of the major strengths of this monograph that it is readily accessible for the non-specialist. As an economist, I gratefully acknowledge Feng's style of presenting engineering and natural science backgrounds in a convenient way. Nevertheless, some minor critique seems appropriate to the extensive presentation of details. To give an example, that 'duct sorbent injection processes . . . can be installed either before or after the electrostatic precipitator . . .' (p. 22) shows that the author is familiar with abatement engineering but does not contribute substantially to the integrated assessment.

From a methodological point of view, Feng's monograph offers no innovation. The applied concepts, however, are up to date. In particular, she provides an excellent overview of the valuation of mortality and morbidity risks. The book provides a comprehensive and truly interdisciplinary approach to an urgent environmental problem. It is one of the rare examples where the demand for interdisciplinarity is met without a loss in the quality.

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Conservation and Management of Marine Mammals

EDITED BY JOHN R. TWISS AND RANDELL R. REEVES

xi + 471 pp., 109 figs., 27.7 × 21.5 × 3.8 cm, ISBN 1 56098 778 2
hardback, US\$60.00, Washington and London: Smithsonian
Institution Press, 1999

This companion volume to the *Biology of Marine Mammals* is a similarly excellent overview of the issues of current concern in the conservation and management of marine mammals. It is a timely publication, which covers aspects as diverse as the history and future implications of marine mammal legislation, the contemporary whaling debate and public attitudes towards marine mammals. Although it is written very much from the perspective in the USA, it contains a wealth of information applicable worldwide. The case studies included indicate the complexities involved and how the success of conserving a particular species depends very much on gaining the involvement of a wide variety of interested groups, from the scientists and managers to those involved in the economic, social and political considerations.

All the chapters are written by the most appropriate people in the field, who are well placed by their experience (even being personally embroiled) to comment on the multiple issues that arise and to understand and fully appreciate their subject. Chapter 1 is an outline and summary of the contents of the volume and the book really begins at chapter two with 'The evolution of North American attitudes to marine mammals'. The definition of attitudes used is 'learned predisposition, to respond in a consistently favourable or unfavourable manner'. It therefore covers the results of detailed surveys into attitudes to marine mammals, their consumptive exploitation, captive display, welfare, media treatment, legislation and research. The discussion on the conflict between the 'wise-use movement', the 'environmental and pro-animal movement' and the 'traditional conservationists' I found fascinating and well-balanced. This is followed in Chapter 3 by the laws in the USA, largely the Marine Mammal Protection Act, Endangered Species Act and the International Authorities.

Chapter 4 is entitled 'Ecosystems: patterns, processes and paradigms' and details how one can think about ecosystems and the marine mammals that are part of them. It takes the reader through this by a series of concepts in the study of large marine ecosystems. These concepts reflect the view that ecosystems are dynamic and are the results of ongoing processes of speciation and extinction. Chapter 5 deals with 'Interactions with fisheries'. This is a very important area for marine mammal conservation and this is the first time it has been reviewed in such a comprehensive manner. The chapter covers all the issues involved from the operational and biological aspects, to the legislation and management measures, with good illustrations, finishing with problems, solutions and approaches to managing competitive interactions with case studies. These are also far ranging from seal culling to large-scale high seas driftnet fishing, important aspects that have not previously been set out and discussed in a single text.

Chapter 6 looks at the 'Tuna dolphin controversy' which 'exemplifies the successes and failures of the Marine Mammal Protection Act'. It is a complicated story, much of which has been buried in the 'grey' literature of reports and internal publications for many years. It is commendable to see this whole issue explained and discussed in a primary textbook. The next chapter also deals with a controversial issue in the USA, 'Seals, sea lions and salmon in the Pacific Northwest', the so-called 'Herschel Problem' after a large male, nicknamed Herschel, was observed frequently taking Pacific salmon near

the Ballard ship locks in Seattle. This whole episode illustrates how difficult it is to document that pinnipeds are significantly affecting salmon runs and that simplistic models with seals as scapegoats to justify culling is not socially acceptable or scientifically defensible.

Chapter 8 is an overview of the International Whaling Commission (IWC) in its contemporary setting. Again, I have not seen this issue reviewed elsewhere and its complexities are soon apparent when reading this chapter. It looks at the dilemmas behind the whaling debate from the revised management procedure to aboriginal subsistence whaling and killing methods, and how the role of the IWC in today's climate is still not universally agreed upon. This leads on to Chapter 9 and the Antarctic Treaty system where international cooperation in this region throughout its history has shown that international law can protect terrestrial and marine habitats. It looks at the evolution of the treaty, USA policy development and the role of non-governmental organizations, and deals with the challenges ahead.

The book then moves on to a series of case-study chapters which investigate the history behind the population declines, the protective measures invoked, the conflicting values and objectives and conservation efforts in a variety of endangered species, namely the Hawaiian monk seal (Chapters 10 and 11), the manatees (Chapter 12), 'Selected small cetaceans' such as the Vaquita and Baiji (Chapter 13) and the North Atlantic right whale (Chapter 14). This section is concluded with Chapter 15 on 'Endangered species, the common denominator'. This is a discussion of the debate between the biological needs of endangered species and the complexities of managing people, looking at the origins of environmental conscience, educating the public and the moral debate over our responsibility towards other species. This is a wide debate which focuses on the moral and philosophical issues on a global perspective. It is a unique overview which is very thought provoking and puts the previous issues discussed for the individual species into context.

Chapter 16 starts a trilogy of chapters on disease, morbidity and mortality issues. Entitled 'Marine debris pollution', it looks at the biological impact of items in the ocean from small plastic objects to derelict fishing nets, hundreds of metres long. Chapter 17 deals with the unprecedented rise in events in which large numbers of marine mammals have died ('Marine mammal die offs'). It gives an excellent review and summary of mass mortalities since the 1950s and goes further into the contributing factors, long-term consequences, responses and even deals with the effects of planning and investigating events which have not been reviewed elsewhere. The final chapter in this group then details the issues pertaining to marine mammal strandings networks which have often arisen out of the die offs. It looks at the development of networks in the USA and deals with the scientific as well as the moral aspects behind rehabilitation and release.

The penultimate chapter looks at the history of 'Marine mammals in captivity'. It sets out the arguments for and against and each paragraph is preceded by an 'argument' statement which is clear and concise and to which a well-balanced response is set out.

The concluding chapter is 'Marine mammal conservation, guiding principles and their implementation'. It offers a set of principles for the conservation of wild living resources, including marine mammals. There are five major principles, each of which is divided into numbered points which precisely document the complexities involved.

I found this a fascinating book. Clarity has been achieved using summarizing tables, schemes and a good subdivision of subjects, which make it ideal as both an introductory text for students and those new to the area, and as a reference volume for the library. I could find

very little to criticize in this book: many of the subject areas are difficult and controversial and are often ignored. It should be gratefully received by those working in the field and is warmly recommended to those who wish to.

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Biology of Marine Mammals

EDITED BY JOHN E. REYNOLDS III AND SENTEL A. ROMMEL
 viii + 578 pp., 187 figs., 27.7 × 21.5 × 3.8 cm, ISBN 1 56098 375
 2 hardback, US\$75.00, Washington and London: Smithsonian
 Institution Press, 1999

This is a comprehensive text and critical review of the biology of marine mammals which incorporates, into a single volume, some of the most exciting developments that have taken place in the field over the last 20 years or so. It encompasses the pinnipeds, cetaceans, sirenians, sea otters and polar bear, often treated in the past in separate volumes, ignoring the power of the more comparative approach that is taken in this text. Its ten chapters cover aspects as diverse as the functional morphology of marine mammals and their exposure to contaminants. It is intended as an introduction for students and a reference for professionals in related fields and it fits this readership niche admirably. It contains some inspiring words for those new to marine mammalogy, such as 'Students entering careers in science should ponder such questions', and many of the chapters are written in such a way as to stimulate thought, indicating new areas that are ripe for investigation.

I was first struck by the breadth of the information in this book and the amount of detail on each subject. The author list speaks for itself as each chapter has been written by scientists with considerable expertise, major authorities in their field. Although the title is biology of marine mammals, many of the subjects have also been considered in the wider ecological context.

The first chapter gives a superb overview of the marine mammals as a group with clear reference tables on their classification and diagrams of their general morphology. The next two chapters detail the functional morphology and physiological adaptations to an aquatic lifestyle. These are comparative in their approach (a section under the 'Neural regulation of diving responses' entitled 'Dogs, ducks and seals' is a good example) with excellent illustrations and graphs. They also bring together all the latest research in these fields and both chapters conclude with an indication of the direction the subjects could go in in the future. The fourth chapter deals with marine mammal sensory systems. It is the first time I have seen all the information on cetaceans and seals brought together and the table of marine mammal sound production characteristics is a good illustration of the detail and extensive literature research the author concerned has carried out. The next two chapters on energetics and reproduction are thorough in their treatment and both include aspects not tackled in other standard texts; the section on energy expenditure comprises the range of issues from the cost of maintenance functions in marine mammals to the energetics of prey choice. The chapter on reproduction is also

unique in bringing together a diverse literature and introduces important issues such as captive breeding and environmental effects on reproduction. There is good cross-referencing to other chapters in the book and although there is some necessary overlap ('Energetics of reproduction' with 'Marine mammal energetics') there is very little repetition.

Chapter 7, entitled 'Communication and cognition', contains a detailed section on humpback whale song which is compared with bird song, and a fascinating part on animal 'language' studies, with a well-balanced review of all the issues surrounding linguistic communication in marine mammals. The next chapter is 'Behaviour' and is divided into sections on pinnipeds, sea otters, cetaceans and sirenians. Each covers the major behavioural areas, namely health and maintenance, foraging patterns, spatial organization, predation and predator avoidance behaviour, mating patterns, sexual segregation and aggregations and migration and social organization, in some detail. I particularly liked the definition of terms in the cetacean section, many of which are familiar but could have ambiguous meanings. This would have been nice to see in the other sections too.

Chapter 9 is a synthesis of the 'Distribution, population biology and feeding ecology of marine mammals'. Again this includes information not previously included in other texts, such as the methods used to study distribution and the molecular and genetic techniques which are now central to many population biology studies. The newer methods for determining diet, such as the investigation of fatty acid profiles in the blubber and milk of marine mammals and their prey and the use of stable isotope ratios are well described and the advantages and disadvantages discussed. These areas are rapidly developing and it is important for students to understand both their potentials and their limitations. The chapter concludes with a section on the role of marine mammals in the marine ecosystem with some critical case studies on the sea otter, a study of lakes and the Southern Ocean ecosystem.

The final chapter of the book is somewhat different to the others, an overview of 'Environmental contaminants and marine mammals'. It is the most comprehensive review of the literature yet compiled, and although it might at first seem not to fit with the overall objectives of the text, I feel it is a crucial area in the biology of marine mammals that has been overlooked or given only passing reference in other treatments of the subject. It covers all aspects from the exposure to the impact at the individual and population levels and has some exceptional, well-referenced tables which summarize the major findings to date.

The style and readability of the book are excellent, many times I found it difficult to put down. Although there are no colour illustrations, all the graphs and figures are at least quarter-page and most are half-page size, which makes them extremely easy to read and understand. The large number of summary tables on each subject will become a valuable source of instant 'facts!' The balance of the subjects was just right and the very rare typographical error was easily ignored. Some of the chapters may have been written some time before publication, which is inevitable for a book of this size, so very recent discoveries will have slipped through the net. However, these minor omissions do not detract from the thoroughness of the book.

Overall I think this is an outstanding and informative text that should be made available to students at every level, professionals working in the field and even those that may only have a peripheral interest in marine mammals. It is very affordable for a book of this size and I would see it easily becoming the leading principal textbook on the subject.

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Environmental Change and Security: a European Perspective

EDITED BY ALEXANDER CARIUS AND KURT M. LIETZMANN

xxvi + 322 pp., 24.2 × 16.2 × 2.4 cm, ISBN 3 540 66179 4
hardback, £44.40/US\$79.95, Berlin: Springer-Verlag, 1999

Translation from the German by Christopher Hay of *Umwelt und Sicherheit: Herausforderungen für die Internationale Politik*, Berlin: Springer-Verlag, 1998

It is clear that environmental degradation in the non-industrialized world leads to or exacerbates local food deficits and rural poverty, generates refugees (both internal and cross-border), and contributes to civil unrest that might in turn lead to internal armed conflicts. Awareness of this inescapable link between environmental security and social (societal) security, which can together be usefully referred to as 'comprehensive human security', has been well recognized within the academic community for 15 or more years now. Such awareness has also been permeating ever more widely throughout relevant nongovernmental organizations and intergovernmental agencies. And today it comes as no surprise when national security doctrines of some of the major powers are revised to incorporate a consideration of threats posed by a lack of environmental or social security in other parts of the world. The volume under review provides yet another good indication that the industrialized world is becoming ever more sensitive to the influence of comprehensive human security, or its lack, on national and international security in the traditional sense.

The 16 essays that comprise this book were originally presented at a conference in Berlin in 1997 sponsored by the German Ministry for the Environment, Nature Conservation, and Nuclear Safety (with the organizational and scholarly assistance of Ecologic, a German environmental research consultancy). Of the 18 authors, 13 are political scientists, four are diplomats, and one is a military officer. The essays, which range in length from four to 34 pages, are logically divided into five groups: (1) five essays (one by a diplomat) that variously explore the notion that environmental security and social security are linked; (2) three essays on the characterization and classification of armed conflicts resulting from a lack of environmental security; (3) three essays on the modelling of environmentally-induced armed conflicts; (4) two essays (one by a diplomat, the other by the military officer) on foreign-policy approaches to dealing with environmentally-induced conflicts; and (5) three essays (two by diplomats) on foreign-policy approaches to preventing environmentally-induced conflicts.

This collection of essays will be of greatest use to the German (and, somewhat more generally, to the Western European) diplomatic community. As such, it will serve as a largely excellent introduction to the subject. Its value to those diplomats and their staffs as a primer on comprehensive human security and its relation to national and international security is enhanced by three appendices, one a compilation of relevant German-speaking

research institutes, the next a list of relevant sites on the Internet, and the third a catalogue of relevant scholarly journals (the last quite skimpy). Several of the contributions can be singled out as being of particular value to those who should be reading this book, amongst them especially Manfred Wöhlke's on the all-too-often overlooked demographic (over-overpopulation) dimension of the problem, Volker R. Quante's on the relevance of the problem to NATO, and Evita Schmieg's on foreign assistance ('development cooperation') as an approach to mitigating the problem. Those interested in modelling will find Detlef F. Sprinz's essay especially useful.

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Larger Carnivores of the African Savannas

BY J. DU P BOTHMA AND CLIVE WALKER

ix + 274 pp., 25 × 18 × 2 cm, ISBN 3 54065660 X hardback,
US\$80.55, Heidelberg, Germany: Springer-Verlag, 1999

In 13 chapters, this book describes the behaviour and ecology of eleven large African carnivores, with some general discussion of savanna ecosystems in the first chapter, and a quick review of the large carnivore guild in the last. Bothma provides the text and most of the photographs, while Walker provides line drawings and water-colours. Although the authors did not state their intended audience, the book seems to be aimed at students, serious amateur naturalists and professional behavioural ecologists.

The central eleven chapters each describe a single species, summarizing information on social behaviour, reproduction, range use, movements, feeding ecology, relationships with other species (mainly prey and competitors), and population dynamics. Each chapter includes a bibliography of about 50 entries on average, though references are not cited in the text. The references on which these chapters are based are generally quite comprehensive for work published between the 1970s and 1995. For some species, the review of literature from the early 1990s is less complete, but still good for a book with broad coverage. These chapters are good, though informal, reviews of current knowledge about these species. For species that I know well, I found the chapters accurate and interesting (with a few omissions). For species with which I am less familiar, I found the chapters thought provoking, interesting, and easy to read. The text does not include citations of original studies, and summarizes conclusions rather than data. This may increase the book's appeal to students and naturalists, but it creates difficulties in evaluating the strength of evidence that supports any given conclusion or proposition.

The introduction to savannas and the general review of the large carnivore guild are relatively brief, providing a good quick synopsis, but are not intended to be serious reviews that might be published in a journal. However, these chapters will be of interest to amateur naturalists and would serve as good introductory reading for undergraduates.

Clive Walker's artwork is beautiful, as are the photographs. There is some sort of illustration on almost every page, illustrating behaviours, tracks, scats and habitats. In this regard, this book is far more interesting and attractive than a typical scientific book.

In short, this book provides a good review of large African carnivores for serious amateurs or students, and a good introduction for professionals.

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Applied Geography: Principles and Practice

EDITED BY MICHAEL PACIONE

632 + xxvii pp., 24.6 × 19.0 × 23.0 cm, ISBN 0 415 21419 X
 paperback, £29.99, London: Routledge, August 1999

The aim of this book is to provide a clear and authoritative treatment of applied geography, defined by the editor Michael Pacione as the application of geographic knowledge and skills to the resolution of social, economic and environmental problems. As such, it is an approach that cuts across intradisciplinary boundaries to involve problem-orientated research in both human and physical geography. In approaching this text, I was keen to see not only how and in what ways the book fulfilled its stated aim of serving first and foremost as a textbook for both sides of the binary divide in the discipline, but also how the concepts and techniques contained therein could be of use to a student of geography. This is important, as there are a multitude of introductory texts to geography (my bookshelves groan under their weight), and to find a niche in the textbook market for first year undergraduates in any of the earth or social sciences, a text has to be both authoritative and wide-ranging.

It is important therefore that any introductory text concisely defines its subject matter at the outset. Here we are fortunate to have

a concise treatment by Michael Pacione of the history and the scope of the approach. I would emphasize the word 'approach' because applied geography cannot, in itself, be described as a sub-field of geography as a whole. To be classed as such, applied geography would have to have a central theoretical core or cores, have a coherent structure and be characterized by a pragmatic approach. The main part of the book comprises four sections, and deals in turn with natural and environmental hazards (eight chapters), environmental change and management (fifteen chapters), challenges of the human environment (fifteen chapters) and techniques of spatial analysis (five chapters). As a colleague put it, this is 'a book to dip into, rather than to read from cover to cover'. I would question the book's assertion on the back cover that it makes essential reading for geography, planning and environmental ... 'researchers'; the material is generally too introductory for that. All this said, the authors are to be commended for their efforts to build knowledge in the student reader. The text is clearly laid out and authoritative, diagrams are for the most part clear and informative, and the use of case study boxes adds to the information base. The focus on prospective views for future applied research in each subject area makes for a thought-provoking read. While I would not recommend it as a core text, at £29.99 for 632 pages, it would be on my list of competitively-priced recommended reading for undergraduate geographers and planners. One final point: the editor and his co-authors have been let down somewhat by the drab appearance of the book with its dull grey cover. A shame, as much of what is inside attempts to be anything but dull.

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