

Book reviews

Beyond Darkness (Nuclear winter in Australia and New Zealand) by A. B. Pittock. (Macmillan Australia, 1987) ISBN 0 725105364. Pp vii + 264, \$AUST 9.95.

Barrie Pittock is a Principal Research Scientist at CSIRO's Division of Atmospheric Research in Melbourne; he is also a passionate, self-avowed Quaker and pacifist. His views on war, and particularly on nuclear war, are well known to his meteorologist colleagues; and, while some may disagree with his conclusions, few, if any, can doubt his sincerity. *Beyond Darkness* is dedicated to the memory of the father of modern numerical weather prediction, L. F. Richardson, who was also a Quaker and peace worker. In it the author draws upon the results of some recent work relating to the possible climatic effects of a major nuclear war (the nuclear winter hypothesis) with the aim of allowing 'ordinary citizens ... to make up [their] own mind[s] regarding the present reliance of our leaders on nuclear deterrence'.

Much of the first ten chapters draws heavily upon two recent weighty (800+ pages) SCOPE reports – *Environmental Consequences of Nuclear War: Vol. I. Physical and atmospheric effects*; and *Vol. II. Ecological and agricultural effects* (reviewed in Vol. 34, pages 129-31 of this journal), but with particular emphasis on Australia and New Zealand. These chapters are, in general, factual, although at times Pittock tends to, too lightly, dismiss his opponents ('much of the criticism [of the hypothesis] has been ill-informed, and very comprehensively answered'; 'the ... elite continues to stress and exaggerate the uncertainties concerning the severity of nuclear winter'). And, sometimes, he presents results from modelling studies as more definite than warranted. For example, the cautious 'atmospheric scientists believe the models *probably* give a *fair approximation* to what *might* really happen' on page 63 changes in a few pages to a quite definite prediction that 'If a major nuclear war were to happen in the northern summer, the [Asian] monsoon rains *would* cease and hundreds of millions of people *would* ... die ...' (my emphases).

The remaining five chapters become more and more personal. Based on his concept of a nuclear conflict made even more horrible and pervasive than dreamed of until recently, Pittock discusses a host of political and

moral issues: Star Wars, Joint Facilities, Aquinas' 'just war' doctrine, AIDS, Life Boat Australia, ANZUS, Rainbow Warrior, and many others; and ends with a chapter – 'Towards hope' – addressed to individuals.

A couple of niggles: I'd prefer each diagram to appear near where it is discussed in the text rather than all being grouped together; and the sideways presentation of some is annoying. I only noticed two or three typos (all in quotations; did they occur in the originals?).

All in all, this book warrants reading by its intended audience.

P. G. Price

Peter Price is Head of Scientific and Technical Services in the Bureau of Meteorology, and Executive Editor of the Australian Meteorological Magazine.

Air quality and resource development – a risk assessment in the Hunter Region in Australia by A. J. Jakeman and R. W. Simpson. (Centre for Resource and Environmental Studies, Australian National University, 1987) CRES Monograph 16. 340pp. \$AUST 19.95.

The sharp leap in the world oil price in the early years of the 1980s was supposed to herald Australia's resources boom. The reasoning was that to offset the high oil price world consumers would turn to Australian coal. This prevailing wisdom was accepted by many of the country's industrial giants who invested heavily in Hunter Valley coal mines, raising coal production from 29 million tonnes in 1979-80 to 43 million tonnes in 1983-84. During the same period a second aluminium smelter began operation in the valley and construction of the Bayswater power station was started.

Such a sudden increase in industrial activity in one of New South Wales' top wine-growing regions produced concern over the resulting environmental effects. In mid-1981 the Centre for Resource and Environmental Studies (CRES) at the Australian National University initiated a study of regional development in the Hunter. One output of the CRES study is this monograph by Jakeman and Simpson which identifies problems that existed at the time, predicts future impacts and proposes policy directions.

The book itself is divided into four sections dealing with:

- (i) the general problem and approach,
- (ii) specific air pollution problems,
- (iii) policy approaches to air pollution control, and
- (iv) conclusions and recommendations.

Altogether there are ten chapters and, more important, seven appendixes. The appendixes provide an exceptionally useful summary of:

- (I) Dose-damage threshold
- (II) The institutional framework for environmental control and planning
- (III) An environmental survey questionnaire
- (IV) Tabulations of dustfall levels
- (V) Statistical models
- (VI) Mathematical models for atmospheric dispersion, and
- (VII) The CRES model for urban air pollution levels.

The appendixes, and especially Appendix I, II, V and VI, bring together material that is difficult to find in one place. In fact, the book as a whole is a valuable document in that it shows meteorology in action. It should be a sobering thought to practising meteorologists that much of the present day interest in mesoscale meteorology is a response to the increased environmental awareness displayed by western nations, yet there are precious few textbooks around that deal with these issues. To be able to obtain a detailed study of air quality in the Hunter Valley for AUST \$19.95 is excellent value.

Nevertheless, the book's proposed audience is never clearly defined. It would be heavy-going for an undergraduate environmental science student, and it seems to be pitched at the post-graduate student and practitioner of environmental arts. I gather that it was originally prepared as a report to the National Energy Research, Development and Demonstration Council (NERDDC), and presumably because of this it tries just a little too hard to establish its academic credentials. What is the use of citing obscure and hard to obtain publications? In a twelve page reference list of 171 items, there are twelve citations to either personal communications or unpublished manuscripts. I find it hard to believe that the ideas in all these cases were of such importance that it was incumbent on the authors to acknowledge the appropriate authority. The opposite problem also occasionally occurs. On page 39 there is the unreferenced statement:

... there is strong evidence that dust and noise from the open cut coal mining activity constitute nuisance problems in the Upper Hunter Region.

Though I think that the remainder of the chapter was intended to display the strong evidence for dust and noise problems on the basis of attitudinal surveys, my reading of the results indicated evidence that dust and noise are *perceived* as problems in two small towns in the Upper Hunter Region, both of which are adjacent to open-cut mines and one of which is on the main highway through the Valley.

The difference between perceived and actual nuisance is more important than it seems because it

is on such small sleight of words that litigious compensation claims can arise. In 1982 the New South Wales State Pollution Control Commission (SPCC) suddenly decreed that all future environmental impact statements for Hunter Valley coal mines must incorporate a dustfall model and threatened that model results indicating annual average dustfalls greater than 10 gram per square metre per month could form the basis for compensation claims against the mining companies. The industry was thrown into mild consternation, bordering on panic, on the basis of a procedure that was ill-founded and scientifically dubious (Beer 1984) with the SPCC finally agreeing that dust was not an overall problem in the Hunter Valley (SPCC 1983).

The monograph has been meticulously proof-read. There were, however, occasions when material seemed to contradict statements elsewhere in the book. Having just cited the SPCC's quantitative 10 gram/m²/month level as an environmentally unacceptable annual average for dustfall, Jakeman and Simpson claim that adverse effects of dust are largely unquantifiable (page 41). On page 159 the authors sympathise with a recommendation not to introduce any new industries producing SO₂ around Lake Macquarie yet two pages previously they:

- (a) show that modelling indicates that even with such new development SO₂ standards would be violated less than 20 per cent of the time; and
- (b) claim the modelling results are suspect anyway.

The worst case of internal inconsistency occurs in relation to Larsen's formula for meteorological effects on gas concentrations. If the formula is written as:

$$X = \alpha \beta^z$$

then Table 1 shows that the definitions are different every time that the formula is mentioned. In fact, the version on page 171 is the correct one.

TABLE 1

Page	z	α Defined	β Defined
171	3.81	geometric mean	geometric standard deviation
289	2.83	median	geometric mean

Larsen's formula highlights the statistical nature of air pollution data and emphasises the geometric mean and standard geometric deviation because the data come from a log-normal distribution. The authors test acid-gas data and show that they fit a log-normal distribution but I found it curious that all dust fallout data are treated in terms of the arithmetic mean and standard deviation, implying that they are normally distributed, when there is strong evidence that dust emissions are also log normal (Beer 1984).

Despite these minor points, I liked the book a great deal. Purveyors of meteorological information collect such information with the demands of the end-user in

mind. As concern for our environment increases, so will the demand for routine meteorological data to be linked to air quality assessment. I would strongly recommend that practising meteorologists acquire this book and read it so that they obtain an understanding of the uses to which meteorological data are put, and the importance of collecting non-standard data such as these on inversion heights.

References

- Beer, T. 1984. Modelling dust from open-pit coal mining. *Proc. 8th International Clean Air Conference*, Melbourne, pp. 225-238 (available from PO Box 481, Hawthorn, Vic. 3122).
- State Pollution Control Commission of New South Wales (SPCC). 1983. *Air Pollution from coal mining and related development*. (available from SPCC, Liverpool St, Sydney, NSW 2000.)

Tom Beer

Tom Beer worked as an environmental consultant from 1981-86 and is now a Principal Research Scientist with the National Bushfire Research Unit of CSIRO.

