

This ever-changing world

Michael Grubb

Environments at Risk: Case Histories of Impact Assessment. By Derek Ellis. *Springer-Verlag*: 1989. Pp. 329. Pbk DM68, £24.50, \$39.50.

Technology and Environment. Edited by Jesse H. Ausubel and Hedy E. Sladovich. *National Academy Press*: 1989. Pp. 221. \$35, £42.

Global Climate Change: Human and Natural Influences. Edited by S. Fred Singer. *Paragon House*: 1989. Pp. 424. \$34.95.

The Next One Hundred Years: Shaping the Fate of Our Living Earth. By Jonathan Weiner. *Bantam Books*: 1990. Pp. 312. \$19.95.

The End of Nature. By Bill McKibben. *Viking*: 1990. Pp. 212. £12.99.

THE greening of both politics and science has spawned many books. In ranging from outright scepticism to apocalyptic visions, this collection throws fascinating light on the role — and limits — of science in the environmental debate.

Ellis's *Environments at Risk* is a modestly conceived book focusing on localized environmental impacts, and is remarkably informative and objective. Careful accounts of past issues range from the centuries-old yet continuing story of monitoring and cleaning the River Thames, through some of the more recent legends of environmental history such as the Minamata tragedy and the *Amoco Cadiz*, up to Bhopal and Chernobyl. Many lesser-known cases are covered. The accounts are not florid tales of disaster, but studies of what happened and why, and the lessons which might be learned — including the role of media and public reaction. The studies are drawn as far as possible from primary sources — something which Ellis emphasizes as

critical in a field where derivative accounts often compound errors.

Accounts of disasters are always more compelling and easier to write than those of environmental successes, but Ellis is also at pains to cover some major industrial developments which avoided significant impact through careful planning. Industrial planners in particular may find these accounts the most informative. For Ellis is clearly of the view that industry can develop without severe environmental or social conflicts — but only if it proceeds with care and sensitivity.

Environments at Risk is not a fashionable book. The account of acid rain is among the weakest of the studies, and other hot topics of stratospheric and tropospheric ozone, waste and global warming are absent. The book is much too detailed and dry to make a popular read. But in addition to forming a valuable reference on many of the skeletons in the environmental cupboard, this volume should be a compulsory read for

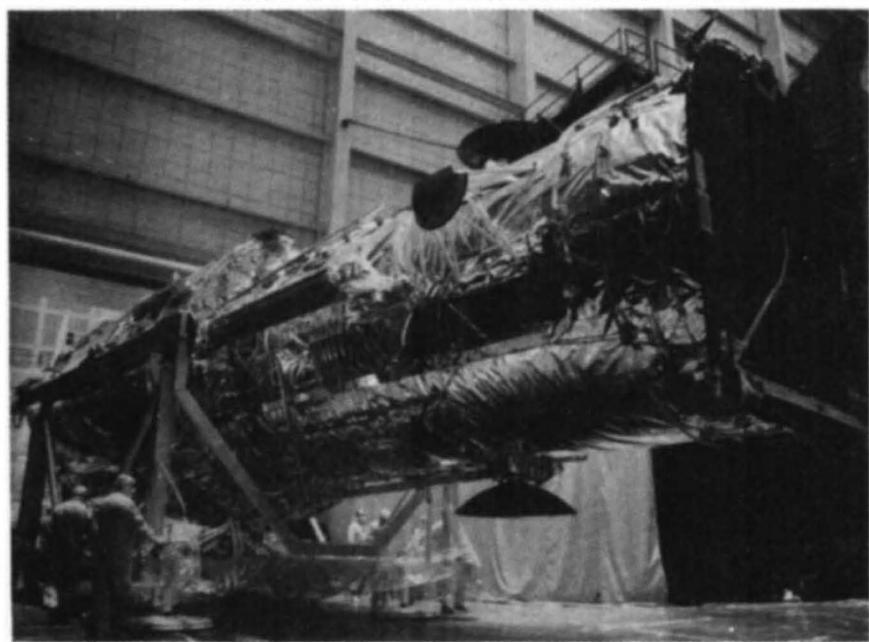
industrial environment managers.

Technology and Environment is a collection of essays which present a more academic and analytical assessment of broader environmental issues. The first three essays set the scene. "Industrial Metabolism" presents the broad concept of analysing industrial activity in terms of its overall materials and energy input, transformation and output — something which emphasizes the extraordinary wastefulness of industrial systems compared with any natural metabolism. As if unconsciously reinforcing this, "Dematerialism" casts doubt on the idea that advanced societies are tending to reduce materials consumption, pointing to various contrary trends that seem to offset specific technological improvements. "Regularities in Technical Development" cites evidence for patterns in technology deployment, especially in transport and energy sources. All three chapters are thought-provoking but ultimately frustrating, presenting many maybes but few hard conclusions beyond the obvious.

Part II, "The Promise of Technical Solutions", presents three competent but unremarkable essays, two on energy (primarily electricity) technologies, and one on chlorofluorocarbons. Far more interesting is part III, "Social and Institutional Aspects", which echoes the frustration of engineers: frustration at the constraints of the environment, the uncertainties of its demands, the ineptitude and inefficiency of environmental regulations, and the overall "paradox of technology development", in which engineers meet one set of demands only to be confronted with a dozen dilemmas from the side effects. In harmony with Ellis, all these essays point to the same conclusion: environmental confrontation patched up with end-of-pipe fixes cannot go on. If technology is to remain more cure than curse, industry needs to anticipate environmental issues and incorporate environmental objectives at the earliest stages of design and planning.

Technology and Environment is an attempt by engineers to develop some of the necessary understanding of broad technological themes. Unfortunately, the quality is patchy and the editing uneven — for example, the logistic curve of market penetration is used repeatedly, but a semi-rigorous description and explanation crops up only in one of the later chapters. The book contains nuggets but, given the depth of expertise included, it is disappointing. If it illustrates one thing, it is that assessing the social and technological side of the environmental equation is at least as difficult and uncertain as assessing the impacts.

But it is when environmental themes are taken to the global level that the going really gets messy. The collection of essays in *Global Climate Change* attempts to set



THE Hubble space telescope in May 1986 during its construction. From *The Space Telescope*, a study of NASA science, technology and politics, by Robert W. Smith and published by Cambridge University Press: 1990 (£40, \$39.50). At the time of going to press, the telescope is still on the launch pad. See the Commentary by Fred Hoyle on page 807 of this issue.

the biggest of them all in a sound scientific setting — and is hopelessly muddling. Refreshingly, the book does not equate climate change with atmospheric pollution, but runs the whole gamut: climatic history; volcanoes and meteorites; the hydrosphere issues of ocean, acid rain and desertification; and 'nuclear winter'. When there is controversy (which means almost everything) the lead paper is followed by a critique from another author. It should be a great book. Somehow, it isn't.

Part of the problem is structure and inadequate editing. Although the book starts with an informative overview essay on climatic history, modelling and various interpretations, it then dives straight into the greenhouse controversy. The "comment" by Ellsaesser is a full-blooded attack on both the institutional process of "consensus science" in the environmental area and on the specifics of greenhouse predictions, concluding that "climate models . . . generally overstate the climatic effect of doubled CO₂ by at least 2- to 3-fold". A reply to the comment seems to decimate Ellsaesser's arguments as dated misrepresentations of modern three-dimensional climate modelling, but ignores the rest of Ellsaesser's case. A short "where do we stand?" paper is then supposed to close the debate by reminding readers that it really is all rather complicated. Similar patterns emerge for ozone depletion, the nuclear winter (or summer?) debate, and volcano impacts.

This is a mixed volume. Some essays are attempts at balanced reviews; some are challenges; some are full-scale research papers. Most are discursive, a couple highly mathematical. Paradoxically, in a volume devoted to debate on physical climate issues, perhaps the best piece is the concluding stand-alone overview of Gaia.

The editor is clearly a universal sceptic, and gives the sceptics on each issue good space — and usually the last word. This gives a refreshing perspective and some challenging observations — but there are times when the scepticism seems to outweigh the science. A process which should lead to an appreciation of where the main uncertainties lie, and what are reasonable balances of probabilities, leads instead to an uneasy feeling that authors are vying for the reader's allegiance between orthodox and non-conformist parties — with the illogical implication that we might as well carry on changing the planet until we find out what we are doing.

Changing the planet is the more explicit theme of Weiner's *The Next 100 Years*. Rarely have I read a book with such a sharp contrast between the start and the core. After wading through half a dozen chapters of very basic science and at times laborious chat about various personal histories in climate observation, I was ready to give up. I'm glad I didn't. The science is

not first class — some questionable studies are uncritically reported and the discussion is not fully balanced. But the book is broad, and in this field at this time that is just as important. In attempting to make the science of climate change and impacts readable, Weiner succeeds in leaving a deep and powerful impression of the global environmental picture, and the many known and countless unknown ways in which humanity is interfering with it.

In "The Severn Spheres", for example, he describes some of the countless interactions and feedbacks between the different spheres of the globe. "Lovejoy's Islands" is a graphic account of how complex ecosystems can unwind when they are reduced below a certain size or overstressed, pointing out that at the same time as warming the climate, humanity is imposing all kinds of other stresses and chopping up the surface in ways which could make the migration of many species that follow the changing weather impossible. "The Oracle of Gaia" broadens the perspective further.

It seems that Weiner knows many of the key scientists well, and this is his homage to their work. He may have overdone the personalization and anecdotes, but the final product reflects the kind of broad intuition for the subject which can be gained only from such an association.

It is a pity that McKibben's book, *The End of Nature*, has attracted much more attention and will probably be much more famous. This is inevitable, not because McKibben is a doomsayer, but because of the book's title, prose and the fact that it takes one simple idea and elaborates upon it endlessly. The idea is not that we are about to destroy the world, but that humans are now affecting the biosphere on a global scale, and that therefore, "we have ended the thing that has, at least in modern times, defined nature for us — its separation from human society". McKibben is not saying that nature will end, but is defining it in such a way as to conclude that it has already ended.

McKibben makes a reasonable defence of the basic idea, and in the rest of the book he attempts to struggle with its implications. Much of the book is concerned with feelings, and we are treated to repeated, lengthy accounts of the forests where McKibben lives, with musings on the beauty of the world and the pity that in the author's sense it is no longer "natural". There is a half-hearted attempt to grapple with the philosophical and quasi-religious implications — after all, the idea does place humans in the position usually reserved for gods — but McKibben is no deep philosopher or theologian.

In considering the future, McKibben castigates "the defiant reflex" of those who think that humanity should in some way manage the world. In doing so he mixes up to an extraordinary degree the

terrifying simplicity of engineered solutions (such as putting dust in the stratosphere) with the efforts of ecologists seeking to minimize and ameliorate the impact of human activities on the biosphere to make reasonable trade-offs between human desires and impacts. Genetic engineering comes in along the way: "the idea that nature — that anything can be defined will soon be outdated. Because anything can be changed . . . 'Rabbit' will be a few lines of code. . ."

McKibben's alternative to the "artificial world" is the "humble idea" of "deep ecology", in which humans avoid all activities that could interfere in any way with the global system. Not merely caution, not dams in place of fossil fuel, but abstinence based on a universal non-human-centred philosophy. "Ecotage" — modern-day luddism — comes close to approval. McKibben notes that deep ecology "is an extreme solution", but "we live in extreme times". Nevertheless, even he shies away from a real examination of what this would mean or, much more important, how societies might get there. I can think of several paths but all of them seem markedly worse than facing up to a minimal degree of ecological management. By refusing to talk about trade-offs, McKibben is setting up a straw man against a dangerous intellectual vacuum.

It is clear from all these books that our understanding of almost everything to do with "the end of nature", to use McKibben's evocative phrase, is still desparately limited. Even the most basic questions remain unanswered, or even unasked. If not Gaia, in its broad sense of biological feedbacks stabilizing the Earth's system, then how has the present balance — so far from the physical equilibrium of a dead planet — been achieved and maintained? But if Gaia, then why the large swings of the ice ages in response to fairly minor orbital perturbations? How can we understand the reactions and limits of the global environmental system when we have no real understanding of how it works or evolved? And it is not only in the biosphere that our knowledge is so limited; as all the attempts to grapple with the societal causes and possible responses make clear, our understanding of the human side is just as poor. These books may not be great, but they are all significant contributions to the many-fold infant disciplines of global environmental sciences. □

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■ In *The Greenhouse Effect: Negotiating Targets*, Michael Grubb examines the debate on international negotiations for limiting emissions of greenhouse gases and addresses the options and implications of failure to reach an international agreement. Available from the above address, price £10, \$20.