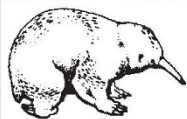


many of the photographs is disappointingly murky and dark, however, and although there are quite a lot of maps, the editors on the whole seem to think basic geography uninteresting, or maybe so familiar as not to be worth much mention in text or index. The series certainly deserves a wide readership amongst professionals, but particularly professionals unfamiliar with the areas concerned, and also among the wider audience presumably attracted by the Duke of Edinburgh's name (and no one else's) on the cover of each of the books.

Perhaps because of my interest in islands, I learnt most from the volume on the Sahara Desert. The editor is moderately successful in getting his authors to stay within the 100 mm isohyet, shown roughly on p.22 and more exactly on pp.106 and 329. The major question over this enormous area of $9 \times 10^6 \text{ km}^2$ (about the size of the continental United States) is whether the desert is spreading south into the Sahel. The editor's introductory chapter, Warren on problems of desertification, Allan on oases and some of the biological chapters discuss the matter, and in particular the problem of detecting permanent changes in areas of most erratic rainfall. Williams on geology, Wickens on flora and Milburn on archaeology and prehistory put the problem in an historical perspective. Only Smith on climate seems to doubt that there is any real change or real problem.

For me, the most surprising information

—Advertisement—



Quaternary Extinctions

A Prehistoric Revolution

Paul S. Martin & Richard G. Klein

More than forty contributors present evidence for major theories—climate vs. overkill—about the disappearance of mammals and birds toward the end of the last ice age. 900 pages (7 x 10), illus. \$65.00 U.S., August 1984.

Darwin: Structure and Distribution of Coral Reefs

foreword by Michael Ghiselin
256 pages, \$7.95 paper, 1984.

People of the Desert and Sea



Ethnobotany of the Seri Indians

Richard Felger & Mary Beck Moser

Records a contemporary hunter-gatherer society's uses of more than 400 plants found in the Sonoran Desert and Gulf of California. About 450 pages (8½ x 10½) with more than 300 illus. \$65.00 U.S., December 1984.

University of Arizona Press

1615 E. Speedway, Tucson, AZ 85719
Member of the Eurospan Group

was about the waters of the Sahara: not just the temporary waters after the rare rain, or the old and modern, engineered, oases, but the natural habitats that supported animals such as crocodiles in the Central Sudan until this century. Again, though, the publishers might have been more careful with the supporting material — the occurrence of crocodiles in the Oued Ihmrou in the mountains of the Tassili N'Ajjer (southern Algeria) is recorded on p.214, but not indexed under either species or place; the mountains are shown on maps on pp.327 and 332, the Oued nowhere (nor in the *Times Atlas*; and can you define an Oued? Would it help to spell it Wadi?).

The Galapagos volume is, not surprisingly, the most successful, as a research station flourishes there and many research workers visit the islands. Physical oceanography, sea birds, seals, inshore fishes and the protection of the marine environment are all covered, as well as the terrestrial aspects. Conservation is dealt with quite thoroughly in Hamann's chapter, "Threats to the Vegetation", and in Hoeck's contribution on the introduced fauna — cattle, horses, pigs, dogs and, as so often, cats, rats and goats are all found on the Galapagos, and there has been some success in containing some of them. But the two chapters on the "Path of Conservation" are very threadbare. Comprehensive this volume is not. The only invertebrate mentioned is the introduced fire ant, herons and such birds come in only casually, while the chapter on terrestrial plants is a scrapbook, including an update of the standard flora and the odd suggestion that there are no endemic plants in the British Isles. Sulloway's mistaken claim about Darwin's finches and the *Origin of Species* reappears. Nevertheless this volume contains a lot of useful information, much of it not available elsewhere in such accessible form.

Many of the authors of *Madagascar* are French or Malagasian, but the English is consistently good. The emphasis is on the vertebrates, especially mammals to which four chapters are devoted. The accounts of economics and conservation, and of nature reserves and nature conservation are much to the point. So this volume is in its way even better than that on the Galapagos, but the content is distinctly thinner.

Threats to natural environments usually come from man's activities, among them the introduction of alien species. Understanding the problems of natural ecosystems requires as much study of man's influence as of the ecosystems themselves, and to that extent the series is lacking. Perhaps later volumes will put this right. The three published to date are nevertheless outstanding accounts of important ecosystems. □

Mark Williamson is Professor of Biology at the University of York. He is author of *Island Populations* (Oxford University Press, 1981), which appeared in paperback last year.

Is it getting better all the time?

Lynton K. Caldwell

The Resourceful Earth: A Response to Global 2000.

Edited by Julian L. Simon and Herman Kahn.

Basil Blackwell: 1984. Pp.585. £14.95, \$19.95.

IN ANCIENT times he who brought bad news to the king risked being put to death for having offended royal dignity and raised doubt about the security of the realm. Today, bad news is no more welcome; *The Resourceful Earth* has been published in the belief that "the world is ready to turn its back on pessimism and is waiting to hear some good news". But in order to secure the plausibility of the "true good news", the "false bad news" must be exposed and refuted. The bringer of bad tidings offensive to the editors and sponsors of *The Resourceful Earth* was the *Global 2000 Report to the President* (1980), commissioned by President Jimmy Carter and released during his last few months in office. Herman Kahn and Julian Simon are the self-appointed executioners of that messenger of "gloom and doom", whose forecasts of bad times to come extend beyond the United States to the entire planet Earth.

The publishers declare that *The Resourceful Earth* challenges the conclusions of *Global 2000*, and presents scientific evidence that sets the record straight. The Executive Summary is more explicit:

The original 1980 *Global 2000 Report to the President...* is frightening. It received extraordinarily wide circulation, and it has influenced crucial governmental policies. But it is dead wrong. Now *The Resourceful Earth*, a response to *Global 2000*, presents the relevant reliable trend evidence which mainly reassures rather than frightens.

The aims of the book are thus twofold: first, to refute the "bad science" of *Global 2000* and, second, to reassure a public frightened and confused by that report's prophecies of global disaster. In achieving its objectives, *The Resourceful Earth* may be regarded as a one-quarter success and a three-quarters failure, a judgement which calls for explanation. The greater part of the book is not the work of Kahn or Simon; it consists of invited papers (some previously published), contributed by more than 20 authors of good repute in science and economics. Its chapters are heavily laden with statistical facts, many purporting to show that "aggregate global and U.S. trends are improving rather than deteriorating".

The failure of *The Resourceful Earth* is not primarily in the 21 contributed chapters, some of which do not actually support the editors' thesis (for example

those by Roger Revelle and Gilbert F. White), and many of which do not undertake explicitly to refute *Global 2000*. Rather it lies in the selective uses and interpretation that the editors make of data pertaining to the environmental future, and in the extravagant claims they and their publisher make as to the achievements of the book:

This is the famous report which demolishes the *Global 2000 Report to the President*. Published here for the first time, it is both a devastating indictment of all doomsday books and also the most scientific inquiry into the future ever organized.

That claim to fame is at least questionable: famous to whom and for how long? The book may have acquired instant celebrity status among those who, aware of its genesis, welcomed at last a refutation of "wrongheaded environmentalism". On the other hand, it may have been regarded as famous — or rather infamous — by those who see its objectives as harmful and its findings distorted and tendentious. Nonetheless except as promoted by believers in its gospel, it seems improbable that *The Resourceful Earth* will achieve the notoriety of *Global 2000* — a point that its editors concede. So its principal claim to fame should be that it demolishes *Global 2000*; in my opinion it has not done so.

While specific findings and predictions of *Global 2000* may be questioned, it is hardly possible to demonstrate that the report as a whole is "dead wrong". Its general validity — and the thesis of the editors of *The Resourceful Earth* — can only be established by events in the future. But *Global 2000* is supported by a much broader and diverse base of evidence than is *The Resourceful Earth* because the two reports differ fundamentally in their approach to evidence. *Global 2000* sought all available reliable data to indicate the trends that, if unmodified, would determine the state of the world by the year 2000 and thereafter. The projections of *Global 2000* followed from evidence unbiased by an intended outcome; the contributors did not set out to find and demonstrate that "the world in 2000 will be more crowded, more polluted, less stable ecologically, and more vulnerable to disruption than the world we live in now". Rather their conclusions reflected the evidence as they read it, which corresponded to the findings of a series of comprehensive analytical models and simulations of the future undertaken by various investigators under various sponsorships since the publication of *The Limits to Growth* report in 1972. *The Resourceful Earth*, on the other hand, was structured specifically to attack *Global 2000*, and the selection and use of evidence appears to have been restricted to this end. The editors make no claim to summarize all the relevant evidence regarding environmental trends — their opening statement in the Executive Summary declares that the book presents "the relevant reliable trend evidence which mainly

reassures rather than frightens".

The Resourceful Earth is advertised as "a devastating indictment of all doomsday books". But "doom", meaning death, total ruin or final judgement, is not the prediction of the greater part of the literature



British Tourist Authority

Living with pollution — "if there is reason to believe that a large part of the evidence of environmental stress and deterioration is valid, does not a responsible government have an obligation to bring this evidence to public notice?"

which Kahn and Simon affect to indict. Major disasters have been forecast, or more often conditionally conjectured, by various writers including well-informed scientists and committees of the International Council of Scientific Unions. The truly "doomsday" books are those dealing with nuclear wars — which Herman Kahn believed were also unfounded and alarmist. If there is reason to believe that a large part of the evidence of environmental stress and deterioration is valid, does not responsible government have an obligation to bring this evidence to public notice?

Kahn and Simon do not think so. "We believe", they write, "that the government should *not* take steps to make the public more 'aware' of issues concerning resources, environment and population", explaining that "the public has been badly

served by having been scared by a very large volume of unfounded and/or exaggerated warnings about these matters". But what proportion of the public has been "scared" by *Global 2000* and similar reports is not made clear. Evidence of a trend towards greater environmental concern in the United States, Britain and Western Europe has been documented by William Cameron Mitchell of Resources for the Future, and by Lester W. Milbrath of the State University of New York. These findings indicate that concern is greatest among the most educated (and presumably best-informed) sectors of the population. Is it plausible to believe that the presumably best-educated and most fully informed members of society can be more easily stampeded into hysteria by misleading pseudo-science than the under-informed members of the body politic?

It is, in fact, far from sure that *Global 2000* is the principal culprit in upsetting the public's emotional equilibrium. In his essay on "Global Climate Trends" in *The Resourceful Earth*, H.E. Landsberg concludes that "although much of the climate portion of *Global 2000* and its sequel is quite sound, the conclusions drawn from them in the news media picked only the frightening aspects up for communication to the public". A harsher indictment of the media is offered by Bernard L. Cohen in his "Statement of Dissent" in which he declares that:

Our government's science and technology policy is now guided by uninformed and emotion-driven public opinion rather than by sound scientific advice. Unfortunately, this public opinion is controlled by the media, a group of scientific illiterates drunk with power, heavily influenced by irrelevant political ideologies, and so misguided as to believe that they are more capable than the scientific community of making scientific judgements.

Global 2000 is also not faulted for scaring the public by the authors of a chapter on "Global Trends in Nonfuel Minerals". Instead they declare that "The merit of *Global 2000* with respect to nonfuel mineral(s) is that it has not said much that is wrong. The defect is that it has not said anything that was not well-known, and it failed to identify and discuss the major policy issues" — which is just what Kahn and Simon say the government should not do. Yet readers of *The Resourceful Earth* might find disconcerting the opinions of two contributors on the prospective use of coal. In Chapter 15B, Petr Beckmann states that "The world's use of coal will increase to some 5 billion tons by the year 2000, in part due to the pressure to replace oil, in part due to the growing demand in developing countries" (i.e. China). Yet the concluding sentence in Chapter 20, "The Hazards of Nuclear Power" reads: "Every time a coal-burning plant is built instead of a nuclear plant, many hundreds of people are condemned to premature death". Is this "reassuring"?

The final claim for *The Resourceful*

Earth is that it is "the most scientific inquiry into the future ever organized". This seems unsupportable, if only because it is doubtful whether any estimate of the future thus far published can be shown to be "the most scientific". Is this a creditable boast for a publication never subjected to peer review? I would contend that none of the projections of the future made thus far are "scientific" except and in so far as they are based upon the best available scientific evidence. Any projection of the future is fraught with uncertainty and the possibility of error — neither *Global 2000* nor *The Resourceful Earth* are exceptions.

Allowing a limited validity to the aphorism "a little knowledge is dangerous", a little *valid* knowledge today may be greatly preferable to common-sense ignorance. The extraordinary growth of scientific knowledge during the past quarter-century provides more and better data than that heretofore available for assessing future trends. But the data do not automatically provide this assessment — neither do the science specialists who develop the data. Individual scientists, including contributors to *The Resourceful Earth*, are prepared to set forth the findings of their specialities but are not necessarily prepared or able to relate them to findings in other disciplines. The global models that Kahn and Simon disparage are attempts to develop syntheses among diverse but related scientific findings — an enterprise hardly possible before the development of powerful and sophisticated computers. Whether this modelling is "science" or merely technique may be a matter of definition; whatever it may be called, it is a relatively recent development. Yet even with its inevitable imperfections (which only experience can correct) it is surely more reliable than Kahn and Simon's simplistic ruler-and-pencil trend analysis.

The foregoing observations indicate where I believe *The Resourceful Earth* has failed to measure up to its billing. But what of its one-quarter success? To me, its limited merit is the occasion which it provides for a careful, critical examination of the conclusions that it purports to refute, and the data it has assembled in the respective contributions on a range of environmental issues. I regard the assumptions of its editors as wrong, but nonetheless deserving of open-minded examination. The Kahns and Simons of the environmental movement are for their part not without comparable sin. In responding to the allegations of *The Resourceful Earth*, the environmentalists may discover shortcomings in their own analysis and be pressed to state more precisely why *Global 2000* and its associated literature deserve to be taken seriously. □

Lynton K. Caldwell is Bentley Professor of Political Science at Indiana University. His most recent book is *International Environmental Policy: Resources and Dimensions* (Duke University Press, 1984).

Making war on the world

Alastair Hay

Environmental Warfare: A Technical, Legal & Policy Appraisal.

Edited by Arthur H. Westing.

Taylor & Francis: 1984. Pp. 107. £12, \$21.

Herbicides in War: The Long-Term Ecological and Human Consequences.

Edited by Arthur H. Westing.

Taylor & Francis: 1984. Pp. 210. £15, \$33.

SEEDING clouds to increase rainfall, breaching reservoirs to cause flooding and denuding forests with herbicides are some of the better known techniques of environmental warfare. All three activities were carried out by US armed forces in Vietnam. Cloud seeding was a failure. Dykes which were breached on occasions caused some flooding, but this never seriously undermined North Vietnam's war effort. It was the defoliation programme which, as far as the US military was concerned, could be pronounced successful. Large tracts of naked forest provided no cover for the enemy and discouraged all movement in the area.

In war the object is to win. If this means destroying buildings or countryside, then history is replete with examples of military commanders who have not thought twice about razing an area; for the soldiers in the field it is a legitimate activity. But as wars become ever more destructive, and as awareness grows of the fragility of our environment, we must ask whether this form of warfare should be allowed to go unchecked.

Environmental Warfare and *Herbicides in War* are both edited volumes, emanating from the Stockholm International Peace Research Institute, which address these issues. If they have one message in common, it is that such practices cannot continue. The first book discusses the subject from a global perspective, whereas the second is concerned exclusively with assessing the impact of the military use of defoliants in Vietnam from 1962 to 1971.

Indochina has not been the only testing ground for some of these refinements of warfare, merely the latest. Dykes were breached in the Franco-Dutch war of 1672–1678 to halt the progress of attacking French forces, and with some success. But the single most devastating act of destruction recorded was during the Sino-Japanese war of 1937–1945, when, in June 1938, Chinese forces dynamited the Huayankow dyke on the Yellow River. Several thousand Japanese soldiers drowned in the subsequent flood and the advance of the Emperor's forces on this front was stopped. The Japanese, however, were not the only victims. Hundreds

of thousands of Chinese were also drowned, millions of acres of crops were destroyed and life on the banks of the Yellow River remained unsettled until 1947 when the river was once again brought under control. It is this latter point that is at the crux of any discussion of environmental warfare — the effects are indiscriminate. Non-combatants invariably bear a disproportionate number of the

IMAGE
UNAVAILABLE FOR
COPYRIGHT
REASONS

Chemical blitz — mangrove forest in South Vietnam before (top) and after spraying with herbicide.

casualties, and in Vietnam too it was the civilians that were the real losers.

Herbicides in War is the published proceedings of a conference held in Ho Chi Minh City (formerly Saigon) in January 1983. The meeting was called to assess the long-term effects of the defoliation programme and, as the book makes clear, those effects were devastating. During the spraying programmes, some 10.3% of Vietnam's inland forests, 36% of mangrove forests, 3% of cultivated land and 5% of other land was sprayed one or more times with a variety of "anti-plant agents". Some 19 million gallons of defoliants were used, the most common of them being Agents Blue, Orange and White — so-called because of the painted bands on the drums in which the herbicides were shipped to Vietnam.

The book contains the reports of working groups which evaluated the impact of the defoliants on Vietnam's ecology and on the health of the population, and the ways in which the toxic contaminant dioxin (2,3,7,8-tetrachlorodibenzodioxin) present in Agent Orange can be measured in the environment. The background to these subjects is provided, in the main, by