

CARBON DIOXIDE: FRIEND OR FOE? By SHERWOOD B. IDSO. Tempe, Arizona: IBR Press (a division of the Institute for Biospheric Research, Inc.), 1983. xiv + 96 p. + 3 tables, 12 figs. Softbound. US \$9.95.

This controversial monograph addresses two topics of vital interest to society at large: the climatic and agricultural consequences of rising carbon dioxide content in the earth's atmosphere, and the conduct, or misconduct, of science.

Atmospheric CO₂ has recently become the center of an increasingly acrimonious climatological debate. Since CO₂ is transparent to visible-spectrum solar radiation but absorbs the longer wavelengths re-emitted from the earth's surface, increased atmospheric CO₂ should cause elevated global surface temperatures. However, it is not clear how marked this effect should be because a number of imperfectly understood climatological interactions may be involved. State-of-the-art climate models predict a response which Idso claims is an order of magnitude too large. He further alleges that the U.S. National Research Council, the U.S. National Academy of Sciences, and certain climate-modellers have conspired to suppress any challenge to this prediction.

Idso's case for a much smaller temperature response to increased CO₂ rests partly on the results of personally conducted meteorological studies, but since he provides no data it is impossible to judge whether his conclusions are justified. More convincing is his demonstration of a recent cooling trend in northern latitudes, where most industrial CO₂ output has been concentrated, in contrast to relatively constant temperatures in southern latitudes. Idso claims that this empirical evidence is in direct contradiction to the climate-modellers' predictions. On the other hand, he fails to mention some important evidence which supports the model predictions, such as increased Antarctic iceberg calving and measurable rises in sea-level, which may herald the break-up of the western Antarctic ice-sheet. Thus his analysis can hardly be regarded as impartial.

Throughout the book Idso champions the empirical, 'real-world' approach as an alternative to computer-based climate-models. The trouble is that whatever uncertainties are associated with the model predictions, at least as great an uncertainty is entailed in predicting the continuation of an empirically observed correlation unless this can be convincingly related to theory. In this volume at least, Idso does not present a convincing theoretical argument to explain why the northern latitude cooling trend should be related to increased atmospheric CO₂. Moreover, since computer-models are nothing more than sophisticated hypotheses which must eventually be tested by empirical data, it is surely preferable that the two approaches should be regarded as complementary rather than as alternatives.

Another problem with the part of the book discussing climatology is the general lack of theoretical explanation. Thus the non-specialist reader may well be left in a confused state concerning such issues as the precise nature of the all-important CO₂-humidity interaction. This is a pity, since the subject matter of the book is of general interest. Moreover, the book's semi-popular format suggests that the author is trying to reach a general audience.

In Chapter VI Idso addresses the implications of rising CO₂ levels for agriculture, a topic which has been understandably glossed over by the climate-modellers. Idso provides extensive experimental documentation for his argument that elevated atmospheric CO₂ should substantially improve crop-yields, and in many respects this is the strongest part of the book. However, the effect that changes in world agricultural and vegetation patterns must in turn have on climate is not discussed, and this is a serious omission. Silviculture, for instance, is not mentioned at all, although the clearing of forests is thought to have had a major influence on atmospheric CO₂ concentration. In view of the vast complexity of and uncertainties associated with the whole CO₂ problem, Idso's call on the last page of the text for augmented CO₂ emissions in order to boost agriculture seems to verge on the irresponsible.

Finally, it is impossible to review this book without commenting on Idso's allegations of scientific malpractice. On the one hand there are grounds for regarding Idso's complaints as more substantially based than an advanced case of sour-grapes. It is becoming increasingly clear that the present system regulating the funding and publication of scientific studies is frequently unfair and counterproductive, and it is right that the general public, as well as the scientific community, should be made aware of this. On the other hand Idso does not present a completely undistorted case. For instance, he objects to his protagonists' "dismay" at a challenge to their work, while actually the cited "dismay" was over the publication of research with a simplistic theoretical basis, whose conclusions hinged on unpublished empirical results, in a highly regarded scientific journal. Was not this dismay justified? Nevertheless, for all the book's shortcomings, the author has packed an astonishing amount of provocative and readable material into his 92 pages. The book was worth

writing, and is worth reading, but should be approached with clear awareness that this will not be the final word in the CO₂ debate.

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DIE SEEADLER. By WOLFGANG FISCHER. Die Neue Brehm-Buecherei, A-Ziemen Verlag, Wittenberg Lutherstadt, GDR. 1982. 3rd edition, 192 p. + 17 tables, 37 illus., 58 photographs. Softbound. M14.20.

In the updated third edition of this book, the late Wolfgang Fischer presents information on breeding biology, population dynamics, protection and conservation of eight species of sea eagles of the genus *Haliaeetus*. This genus has a worldwide distribution except for South America where an ecologically similar group of eagles is represented. The Steller's sea eagle (*H. pelagicus*) of eastern Asia is the largest member of the genus. The wings of the larger females span up to 2.8 m and their bodies weigh 7-9 kg.

Although collectively called sea eagles these species vary considerably in the degree to which they are associated with aquatic habitat. The whitebellied sea eagle (*H. leucogaster*) is found only near the coast, from India to Australia. The Steller's sea eagle inhabits the seacoast and the lower reaches of large rivers in northeast Asia. The whitetailed sea eagle (*H. albicilla*) of Europe and Asia, and the bald eagle of North America (*H. leucocephalus*) primarily frequent the coasts but also occupy large rivers and lakes. The bald eagle builds ground or cliff nests less commonly than does the whitetailed sea eagle. The rarity of ground- or cliff-nesting by bald eagles, according to the author, may relate to their absence from the Canadian Arctic north of the tree-line; the whitetailed sea eagle nests on the ground on treeless islands in northern Europe and Asia. The African fish eagle (*H. vocifer*) and the Madagascar fish eagle (*H. vociferoides*) commonly inhabit rivers, lakes and inland swamps in addition to the coasts. The Pallas' sea eagle (*H. leucorhynchus*) occupies inland waters and also arid regions of central Asia, and is rarely found near the coast. The Sanford's sea eagle (*H. sanfordi*) inhabits inland and coastal forests. Its long tail, and dependence on pigeons and phalangers rather than fish and carrion as prey, set this species apart from the rest of the group. The author refers to this species as a "sea eagle of the forest".

The author adopts a species approach in his book, treating the whitetailed sea eagle in detail (67 of 151 pages of text), and points out ways in which the other seven species differ. The whitetailed sea eagle is similar to the North American bald eagle except that it is larger and does not develop a white head. Adult plumage is reached at 5-6 years of age. The breeding biology and behaviour of whitetailed sea eagles is described in detail, including a discussion of reproductive maturity, pair formation and courtship, nest site characteristics, laying, incubation and the rearing of young. Fischer describes vocalizations during courtship which are synchronized between male and female, akin to the "unison call" of cranes. Breeding activity occupies the major portion of the year, from nest building as early as November in central Europe to the gaining of independence by the young in August. The male is the primary provider for the one, two or sometimes three young.

As is typical of sea eagles in general, the whitetailed sea eagle prefers to eat carrion. It also robs other predatory birds of their food to obtain its daily food requirement of 500-700 g of meat. When a shortage of carrion demands it, live fish, birds and mammals are taken. This eagle may become entirely submerged in water when catching a live fish, may attempt to tire a diving duck by swooping repeatedly for as long as 45 minutes, or may opportunistically prey on the young of large mammals including fox, seal, and caribou.

In the section on persecution and protection the author reports that in recent years, after a dramatic decline and extermination of sea eagles in some areas, populations appear to be recovering in parts of North America and Europe. Historically, persecution was the major factor in causing population declines; later, bioaccumulation of toxic chemicals in the environment, the loss of habitat, and a reduction in food availability were added. Of all species in this genus the Madagascar fish eagle (*H. vociferoides*) is most in danger of extinction.