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Climate and Water

Last summer's above-average temperatures and the Midwest drought were widely interpreted as scary consequences of a greenhouse effect. But in the cold light of wintry days, the prospect of a little added warmth does not seem so menacing. Moreover, there is leisure to look at past records of weather and climate fluctuations. In particular, abnormally high temperatures and drought were characteristic of the dust bowl days of the 1930's. A careful study covering the years 1901 to 1984 by the National Oceanic and Atmospheric Administration and involving 1219 stations indicates that there has not been a long-term upward trend in average temperatures in the 48 contiguous states, although there has been an increase in the average minimum temperature.* In a recent article in *Science* (K. E. Trenberth *et al.*, 23 Dec., p. 1640), the 1988 drought was related to an exceptionally large amplitude in the Southern Oscillation, which gives rise to El Niño and other effects. The authors reminded readers, "Little difference in the radiative effects of greenhouse gases is expected between this year and last. . . . [T]he greenhouse effect may tilt the balance such that conditions for droughts and heat waves are more likely, but it cannot be blamed for an individual drought."

Scientists are not unanimous in believing that increases in greenhouse gases will necessarily result in the kind of temperature increases (2° to 5°C) that some modelers predict. Skeptics can point out that weather predictions for only the next several days are often wrong. Nevertheless, it is a fact that humans are conducting a great geophysical experiment. A continuing increase in greenhouse gases seems virtually guaranteed as developing countries seek to achieve standards that the developed world enjoys.

A practical approach to climate uncertainty is the activity of the AAAS Committee on Climate, chaired by Roger Revelle. Their initiatives have led to a book on climate and water that will be published later this year.† The committee and a substantial group of interdisciplinary experts have examined what the probable impacts of a 2° to 5°C rise in temperature would be on supplies of water in the contiguous 48 states. Some areas of the United States would be wetter than at present; other areas, drier. Computer simulations of a future greenhouse climate show drier summers in the interior of North America. Effects would be greatest in the arid West, where a small change in precipitation makes a relatively big change overall. Warming would make it difficult to maintain present irrigation in the West. In the East, where water would continue to be abundant, the area under irrigation is expected to increase. Everywhere the increase in CO_2 would make plants grow faster and reduce the amount of water that would escape from leaves.

The report includes some comments designed for planners. Present storage systems for water are likely to be inadequate in some places. As seasonality changes, snow would melt earlier and the floods would fill reservoirs at new seasons. Fluctuations could be damped by larger reservoirs and advantage should be taken of storage in aquifers that are not subject to evaporative loss.

The report calls for further studies to delineate more accurately the problems likely to arise and improved means of coping with them. For the present, however, the authors are guardedly optimistic about practical actions being taken concerning water. They state, "Despite a flurry of publicity, the managers of urban water systems, for example, testify climate change is not yet on their lists of worries. . . . A place is more likely won if the problem is considered serious like AIDS; if it is considered certain like the link between smoking and cancer; if it is considered soon like a flood from a weakened dam; soluble like finding a substitute for CFC's; and if the villain can be identified like the dumper of barrels leaking poison. . . . Proposal of feasible solutions enhances the chance of winning a place. . . . The proposals for arresting climate change are many and hard to manage. Those pertaining to water resources, like water banks or conserving irrigation water, seem more manageable because they can be done bit by bit and they extend present policies rather than require changes in the way we live."—PHILIP H. ABELSON

*T. R. Karl, R. G. Baldwin, M. G. Burgin, "Time series of regional season averages of maximum, minimum, and average temperature, and diurnal temperature range across the United States: 1901–1984" (NOAA, Asheville, NC, March 1988). †P. E. Waggoner, Ed., *Climate and Water* (Wiley, New York, in press).