reduce streamflow, thereby endangering the adequacy of the downstream flow to dilute municipal waste discharges. Third, it would not create any of the potential atmospheric liabilities mentioned in the article—e.g., possible fog, ice formation on roads and power lines, reduction in visibility, or the formation of snow.

Fourth, and most important perhaps, it could permit the return of the water to the natural environment at a much more acceptable temperature, since the underground system could be made as extensive as required to effect the necessary cooling. In fact, the more extensive the system the better, for it would allow greater advantage to be taken of the larger amount of warmed agricultural land. This latter advantage could be a very real economic asset, since many marginal production areas for certain crops could be made sure or safe regions. Some areas could be made to support two or three crops a year, and some could be turned to different, more high-priced crops.

C. B. Pritchard
4203 E. McDonald Dr.
Phoenix, AZ 85018

Benefits of clean water

DEAR SIR:

Your February 1972 editorial, "How clean is clean enough," makes a reasonable plea for benefit studies in pollution control. I too believe benefit-cost studies should be made in pollution control, just as in any other program of resource management.

Recently I made a first estimate of the value of clean water in Illinois. In attacking this problem, I found no theoretical difficulties in making such estimates, thanks to the work in recreation economics of Clawson, Knetsch, and others. Naturally there are practical difficulties in correlating water quality with impairment of indirect uses such as recreation. On the other hand, cost of treating water of different qualities for municipal or industrial use can be readily estimated by qualified engineers.

Recreation benefits were estimated in the following manner: A pollution index, involving six water quality parameters, was evaluated at each water quality sampling station, and then correlated with fisheries sampling data. Fisheries data were then correlated with potential density of recreational use in visitor-days/acre/year. Total visitor-days for the state were computed using water area as a weighting factor. An average unit value (net of average development cost) was applied to total visitor-days to yield total recreation value.

Estimates were made for three conditions: existing water quality, water quality meeting standards, and wholly degraded water quality. A variant of the procedure was applied to estimate economic value of commercial fisheries.

Benefits of improving water quality are the increased value of recreation, increased value of commercial fisheries, municipal water treatment cost savings, and industrial water treatment cost savings. These totaled $108,000,000 per year, of which recreation contributed $78,000,000.

Losses associated with degraded water quality are the lost current recreation values, lost commercial fisheries value, increased cost of municipal water treatment, and increased cost of industrial water treatment. For totally degraded water quality in Illinois these losses

SINKS AND SOURCES

The Spoils of Progress:
Environmental Pollution in the Soviet Union
by Marshall I. Goldman
$7.95

Rapid industrial growth rather than form of government is the prime agent causing environmental havoc, and in the Soviet Union the ecological balance has been upset, as it has in every major industrial country.

Marshall I. Goldman, whose articles on the subject have appeared in *Science*, *The New York Times*, and *The New Yorker*, brings this point home as he describes abuses of water, air, land, and raw materials in Russia, analyzing the forces that have brought about the current situation and describing both the drawbacks and advantages of state control and conservation.

New Energy Technology — Some Facts and Assessments
by H. C. Hottel and J. B. Howard

This report concentrates on the technological status of energy and fuel conversion processes in the United States. It assesses the technical and economic adequacy of existing and proposed processes (and their consistency with developing standards of environmental quality) and suggests where additional effort is needed to accelerate change.
$10.00 hardcover
$2.95 paperback

The MIT Press
Massachusetts Institute of Technology
Cambridge, Massachusetts 02142

Circle No. 10 on Readers' Service Card

totaled $273,000,000 per year, of which recreation contributed $194,000,000.

Before these data can be compared with cost, total cost must be separated into cost for enhancing quality and cost for maintaining current quality. I have not yet been able to do this. However, a useful comparison can be made between total cost and total value of clean water. The total value of clean water is the sum of gains and losses—$381,000,000 per year, for Illinois. Available estimates of our annual cost of achieving clean water (including current costs) are significantly less.

This aggregate estimate for Illinois does not prove each pollution control project is individually justified. Each deserves its own evaluation. It gives us hope, however, that with good engineering and judicious investment we can achieve clean water with a net gain for society.

Bruce Barker
Illinois Department of Transportation
Springfield, IL 62706

Inflation's not so sweet

DEAR SIR:

I found the article in your December 1971 issue entitled "Hawaii's sugar industry faces tough problems" to be interesting and informative. There are, however, a couple of instances in which dollar figures somehow got inflated even faster than the usual rapid rate.

In one instance, the article says, "Cane brings about $1.6 billion to the islands each year." Actually, in 1971 the total returns from production of sugar and molasses is estimated to be $202 million.

At another point, Mr. Berg is quoted as saying, "The industry would be spending some $10–12 billion in the next five years for pollution control." The figures are correct, but again this is *millions*, not billions.

R. L. Cushing
Hawaiian Sugar Planters' Association
Honolulu, HI 96822

Textile waste data

DEAR SIR:

Many of the data in the article, "Water uses and wastes in the textile industry," by Porter, Lyons, and Nolan in the January 1972 issue of ES&T, first appeared in "A simplification of textile waste survey and treatment," written by Joseph W. Masselli, Nicholas W.

(Continued on p 392)