# Book Reviews

## Energy and the Food System

**Food Production and Consumption**. The Efficiency of Human Food Chains and Nutrient Cycles. A. N. DUCKHAM, J. G. W. JONES, and E. H. ROBERTS, Eds. North-Holland, Amsterdam, and Elsevier, New York, 1976. xx, 542 pp., illus. $48.95.

It is a fascinating challenge to an economist to review this book on the efficiency of human food chains and nutrient cycles. Economics is, after all, the science of efficient allocation of scarce resources to meet human needs. Economists have long argued that with the "right" prices and with all externalities considered, cost-benefit analysis provides investment and consumption allocation rules that maximize social welfare within a given income distribution. A corollary of this basic theorem is that no single unit measure of efficiency, whether output per hectare, per man-year, or per joule of incoming solar radiation, provides an appropriate criterion for making either private or social decisions.

A new perspective has emerged in the past decade to challenge economists' stranglehold on decision criteria. In the words of the editors of this book, "For long-term planning, energy is a more basic currency than cash since cash values are subject to ephemeral and artificial fluctuations" (p. 499). Thus the book uses the efficiency criteria of energetics rather than those of economics to judge the human food chain, from incoming solar radiation to final digestion of dry matter, protein, vitamins, and minerals by the human biomass. The book contains chapters describing the ecological and biological processes that play a role in human food chains and nutrient cycles as well as chapters on the social and economic aspects of the subject.

The finding that only about 0.4 percent of the net photosynthate that could be formed on cultivatable land is actually eaten by humans conditions the entire orientation of the book. The finding makes the inefficiencies in the demand sector (level of income, distribution of income, price levels, habits and tastes, and so on) look small. And so the various authors concentrate on the production side, arguing that it is there that the large gains can be made and that "increasing supply by biological improvements in order to meet biological and economic demand may be politically and socially more acceptable . . . than attempting to satisfy biological demand between, and within, countries and households by political and social means. . . . The aim should be to double or treble supply, at household level, by biological means at the lowest economic cost, with minimal social upheaval, with minimal support energy and with the minimal number of decision makers" (pp. 513–514).

Even an economist can recognize an overobjectified system when it is as obviously so as this one. It is impossible to minimize economic cost, social upheaval, support energy, and number of decision-makers simultaneously. Clearly, some trade-offs must be made, and it is precisely the need to cope with trade-offs that makes the decision criteria of economics and not those of energetics the ones of choice. Economics forces decision-makers to consider alternative outcomes, which usually have different political implications, and it is economics and not energetics that offers the means to calculate the various outcomes in the face of a large number of inputs and objectives.

Given such a perspective, the approach taken in the book under review is problematic. The decision to treat the demand issues as relatively unimportant in the task of feeding the world to the year 2000 flies in the face of the recent National Academy of Sciences World Food and Nutrition Study, which gives the issue of food access at least as high a priority as that of production. The concentration on supply efficiencies leads, almost inevitably, to some inane and naive recommendations and observations, such as that "potentially cultivatable areas which cannot now be used because of pests and disease problems should be brought into cultivation, especially in potentially or currently densely populated areas" (p. 474) and that "the poor in developing countries often do not spend enough money to satisfy their biological demand" (p. 465).

Obviously any value the book has must lie in other areas, and it does make several valuable contributions. Energy flow through the agricultural and food system is a useful concept by which to organize an extraordinarily complex subject, and some of the observations about the relative energy efficiencies of different systems may point to productive research opportunities. The chapter by Leach presents this view well and should prove a valuable reference for those not prepared to read his book on the topic. Similarly, the complexity of the food chain forces most authors to use at least conceptual models. Charlton has provided an elegant chapter on the use of models in systems research. He is properly skeptical and enthusiastic at the same time. His influence is felt throughout the book and is no doubt the reason no full-blown model of the system is actually attempted.

For all the flaws and the biased perspective, the book is a major attempt by eminent scientists to address the most pressing problem of our time. Good science by itself will not eliminate world hunger or diet-related diseases of affluence. But good science will play a major role in delimiting the options available in the short run and widening them in the long run.

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## Housing Choices

**Environmental Choice, Human Behavior, and Residential Satisfaction**. WILLIAM MICHELSON. Oxford University Press, New York, 1977. xx, 404 pp., illus. Cloth, $10.50; paper, $6.50.

William Michelson's book reports on the first major longitudinal study of housing conducted in North America, a study of more than 750 households in metropolitan Toronto, each of which was interviewed immediately before a move and at subsequent points ranging up to slightly over four years after the move.

Michelson attempted to explore the questions "who moved where?," "why?," "how did they like it?," "how did it affect their behavior?," and "what were their future plans?" The questions are obviously not independent, and it is the interactions between the answers to