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## Book reviews

### World agriculture: toward 2000

*World Agriculture: Toward 2000, an FAO Study.*  
Nikos Alexandratos (Editor). Food and Agriculture Organization of the United Nations and John Wiley and Sons, Chichester, UK / New York, USA, 1995, xxvi + 488 pp., US \$50.00. ISBN 92-5-103590-3.

This is an excellent book, one that anyone interested in the past and prospective future of the global agricultural system, particularly that part in the less developed countries (LDCs), should study. The presentation is analytical and judicious in discussing the major demand, supply and policy forces shaping the future of LDC agriculture. The data used are appropriate for the main lines of argument, and the strengths and limitations of the data are carefully noted. Full weight is given to natural resource and environmental degradation as elements that must be explicitly considered in any assessment of past and potential future performance of the agricultural system. As indicated in the title, the time frame for the analysis is from roughly 1990 to 2010. The point is made that the agricultural future sketched in the book is a best estimate of what might happen, not of what in a normative sense one would like to see happen.

The book falls logically into four parts: (1) an assessment of various indicators of past agricultural performance, with special emphasis on the LDCs; (2) projections of future growth in global demand for agricultural output; (3) analysis of the issues involved in mobilizing the natural resource and technological and other knowledge resources needed to meet the anticipated demand at acceptable economic, environmental and other social costs; and (4) an account of the policy changes that LDC governments

and international organizations are likely to adopt in seeking to meet the challenge of resource mobilization.

The assessment of past performance reveals several particularly noteworthy facts. One is that the much discussed decline in world per capita agricultural production in the 1980s, which some have seen as a negative sea-change in global production capacity, was wholly attributable to production declines in the more developed countries (MDCs), reflecting policies adopted to reduce surplus production. In the LDCs, 8 year moving average per capita production grew at about 0.9% in 1961–1969, fell to about 0.3% in 1967–1975, then rose steadily to about 1.4% in 1977–1985, then fell to about 1.1% in 1981–1989, where it remained through 1984–1992.

Another fact revealed by the assessment of past performance is that the number of undernourished people in 93 LDCs (including all of the big ones) declined from an estimated 941 million in 1969–1971, to 843 million in 1979–1981, to 781 million in 1988–1990. As a percent of the population in these countries, the undernourished declined from 36 to 26 to 20. These numbers not only support the estimates of rising per capita production over time, but they also indicate that the undernourished (who must correlate strongly with the poor) benefited substantially from the production increases.

The third noteworthy fact about past performance is that the improvements in per capita production and in nutrition from the early 1960s to the early 1990s were wholly confined to Asia and Latin America and the Caribbean. In sub-Saharan Africa (SSA), per capita supplies of calories were only maintained or even declined slightly from 1961–1963 to 1988–1990. Consistent with this, the number of undernourished people in SSA increased from 94 million in the

late 1960s to 175 million in the late 1980s, and the percent of the population undernourished rose from 35 to 37.

A question is asked in the book about the economic and environmental costs of this generally good performance over the last several decades (SSA apart). It is noted that real international prices of most agricultural commodities declined over this period, suggesting that unit economic costs of production were falling. Reference is made to data suggesting that agricultural production in the LDCs has been and is degrading the productivity of both land and water resources. Using these data, I estimated that in the LDCs the cumulative effect of this degradation over the last 35 to 45 years was a 5–12% loss of crop productivity (Crosson, 1995). This productivity loss would have tended to increase economic costs of production; however, the decline in real commodity prices indicates that advances in technology, management and other kinds of knowledge more than offset the cost effect of degradation-induced losses of productivity.

Data adequate to judge the overall effect of the production increase on environmental costs are not available, although in the report reference is made to fragmentary evidence suggesting that the costs rose. No judgment is made whether environmental costs may have risen enough to offset some or all of the evident decline in economic costs.

The study projects that the decline in the rate of growth of global agricultural production recorded over the last several decades will continue to 2010, and beyond. The reason is not rising economic or environmental costs, but a declining growth of demand, reflecting slower population growth in the LDCs and slower growth in per capita demand, as more and more countries reach saturation in food consumption.

FAO data cited in the book indicate that the 760 million ha that the LDCs currently have in crop production is only 30% of the 2.6 billion ha of land in those countries with rainfed crop potential. Nonetheless, the study projects only an additional 90 million ha of cropland in the LDCs, a 12% increase. The reason for this small increase in cropland is that conversion of much of the land with crop potential would entail sharply rising economic costs, because of poor quality soils and distance from markets, as

well as a variety of environmental costs, particularly those associated with tropical deforestation.

It follows that most of the increase in production to 2010 will have to come from increases in crop yields and animal productivity. This is “conventional wisdom”, but the study’s discussion of the conditions that must be met to bring the needed yield increases into effect is rich in detail and intelligence. Much emphasis is put on the need to shift from new technologies featuring “hardware” to those more heavily based on knowledge of biological relationships between crops and soil, weeds, other pests, and climate. This includes knowledge of how agricultural production impinges on the environment off the farm and of how these impacts can be made consistent with long term sustainability. The emphasis on biological knowledge points to the importance of improvements in human capital. The study focuses on farmers in this respect; I would argue that the knowledge of people off the farm, particularly in government, but with responsibilities for agriculture also must be increased.

In the editor’s preface, it is stated that the book is focused on two issues of “global import” that “would seem to dominate all others”. One is the problem of food insecurity. The other is “the process of increasing scarcity and degradation of agricultural and other environmental resources” under the pressure of rising demand (pp. xx–xxi). I have no quarrel with the first issue, but I question whether natural resource degradation is or will likely be a significant source of natural resource scarcity (Crosson, 1995). The critical threat of resource degradation is the threat to the capacity to increase the supply of knowledge resources needed for use in LDC agriculture (Crosson and Anderson, under review). Despite the point made in the preface, the discussion in the book of the importance of developing new agriculture-relevant knowledge is consistent with this position.

In this short review I cannot do full justice to the excellence of this book. Readers are urged to get the book and see for themselves.

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## Modern rice technology and income distribution in Asia

*Modern Rice Technology and Income Distribution in Asia*. Christina C. David and Keijiro Otsuka (Editors). Lynne Rienner Publishers, Boulder, CO, USA, 1994. xxiii + 473 pp., US \$19.95. ISBN 1-55587-431-2.

The Green Revolution has generated an unprecedented development of rice over all other crops in the Asian region for the last 20 years. As a result, changes in the rice economy led to early concerns of a bias against small-scale farmers and landless households. The concern was that the income gap between large farmers and others would widen and the distribution of income would become more inequitable. This book confronts the central issue of whether the diffusion of modern varieties of rice (MVR) and accompanying changes in production technology have had important redistributive effects on rural household incomes in Asia. The authors conclude that those direct effects are not significant due to indirect labor, land and product market adjustments. That conclusion is based on the findings of several country studies

The book contains a methodological treatment of the distributional issues and a compilation of empirical findings. The introductory chapters (Chapters 1–3) lay the conceptual and theoretical groundwork for the empirical studies which follow. A majority of the book (Chapters 4–11) reports on country case studies in the Philippines, Indonesia, Thailand, Bangladesh, Nepal, India and China. Each country study is a similar but not identical application of the methodology to village-level survey data. In this regard the book is a well-integrated compilation of work by several authors, which lends itself to a

comparative analysis of country experiences. The concluding chapter provides a useful summary of the major findings and a statement of the policy implications. We find that the book is well written and would appeal to the interests of a wide range of analysts and policymakers.

David and Otsuka attempt to quantify the impact of differential MVR adoption on rice production in Asia using pooled cross-country, time-series data. The results of their estimation of the yield function confirm that there is significant interaction between MVR adoption and the use of irrigation (a major characteristic which resurfaces in the country studies). They conclude that “differential modern variety adoption is the single most important factor explaining the widening yield gap across production environments” (p. 16). That may well be overstating the case, since the adoption of MVR is but one factor in the set of factors which may have been contributing to yield gaps. Moreover, the estimated equation predicts the log of yield level not yield gaps per se, and several important interactions make it difficult to identify the singular effect of MVR adoption on yield gaps.

Some readers may find the analytical framework (Chapter 3) tedious, because of the lengthy derivation of equations. We find it to be an indispensable part of understanding the rationale for and structure of the empirical work which follows in the country studies. Several assumptions are made in the derivation of the factor price equations, some of which would need to be supported in an empirical application. Unfortunately, those assumptions are not tested in the later chapters. Due to the lack of exogenous variables, the authors find that a reduced-form estimation is more appropriate than a simultaneous equations approach. This limits the extent to which structural relationships can be attributed and quantified.

A modified Glni decomposition rule is used to isolate the contribution of various income sources to overall income inequality. It is widely recognized that the Gini ratio (as a measure of income distribution) is subject to various problems, yet it lends itself to this form of component analysis. David and Otsuka acknowledge three major limitations of the income inequality analysis. The third factor (collinearity between MVR and favorable environments)

overestimates the contribution of MVR adoption to income redistribution and we expect that it is a relatively more significant factor in the reported country studies.

David and Otsuka state that the analysis is focused on factor price and household income differentials between regions and among farmers, not with absolute changes in prices and incomes. In this regard it is assumed that: factor prices and technological change are positively related, technology impacts are greater for the land market than for the labor market, and the regional differential of wage rates determines the interregional migration of labor. The results from the subsequent country studies provide weak support for the first two relationships. The third relationship is largely untested due to data limitations.

Readers will find that the specifications of the estimated equations are not the same in each case. This makes a direct comparison of the effects across countries more difficult. For example the household income equations include several interaction terms, but those terms vary from study to study. As a related point, the comparability and quality of the household income data from the intensive village surveys is of some concern, since it is commonly recognized that income data is subject to bias. The country studies do not address this issue. One of the central questions is whether a smaller income from rice in a less favorable region is compensated by a larger income from nonrice or nonfarm activities. In this regard the redistributive effects of MVR (or new technology) adoption is a complex question, because technology diffusion itself is constrained by numerous factors, including technical and environmental conditions — most notably the availability of irrigation. Lipton and Longhurst (1989) charge that major agricultural innovations, which employ more labor and grow more food, often help those who are better-off more than they help the poor. In addition, they suggest that the rural poor come to rely increasingly on labor income, so their benefits from modern varieties become more vulnerable to “dilution and diversion”, due to systemic effects. The results from this study generally indicate that the redistributive effects of MVR adoption are mitigated by systemic factors, which include adjustments in labor markets and employment patterns. However, the country

studies also confirm that residual land income becomes a more important component of total household income. Consequently, farm income may become more unequally distributed due to technology (not just MVR) adoption. The country studies are not conclusive on the relationship between MVR adoption and land resource endowments (e.g. farm size).

The country studies focus on analyzing how the adoption of MVR technology influences the incomes of people in favorable versus unfavorable rice-growing regions. Identifying the singular effects of MVR adoption is complicated by the adjustment of wage rates, the migration of labor, and multiple sources of farm labor. With respect to labor utilization, several country studies suggest that the MVR technology is “hired labor biased”, yet the mobility of landless or migrant labor is apparently greater than other categories of labor. Thus, the ability of labor markets to adjust appears to be more directly related to the availability of seasonal labor, rather than substitution between family and hired labor. The study lacked adequate data on migration to test for the relationship with MVR adoption. Therefore, the “bias” may well be between various forms of hired labor. This raises some questions. Does increased demand for migrant labor reduce income inequality between favorable and unfavorable regions? How effective are wage rate differentials in motivating labor mobilization as the distance from a favorable rice-growing area increases?

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## Feeding and greening the world

*Feeding and Greening the World: The Role of International Agricultural Research.* Derek E. Tribe. CAB International (in association with The Crawford Fund for International Agricultural Research), Wallingford, UK, xiii + 274 pp., UK £16.95 and US \$29.50. ISBN 0-85198-920-9.

In 1991, Professor Derek Tribe published in Australia a slender volume entitled *Doing Well by Doing Good*. In it, Tribe argued that by putting foreign assistance funding into international agricultural research, Australia was not only promoting economic development abroad very effectively, but was also benefiting directly through major gains in agricultural productivity based on adaptation of the research results to Australian conditions, and through increased trade with developing country beneficiaries. That book, and the work of the Crawford Fund for International Agricultural Research of which Tribe is Executive Director, are credited with halting a budget driven decline in Australian support for the centers sponsored by the Consultative Group on International Agricultural Research (CGIAR) and related Australian activities, and bringing about a significant and continuing increase.

In his new book, *Feeding and Greening the World*, Professor Tribe has taken aim at a larger target, the international group of politicians and officials in the major donor agencies who determine the allocation of foreign-assistance resources and the members of the public who might influence those decisions. Tribe seeks to explain why sustained and growing funding of agricultural research in general, and the institutions affiliated with the CGIAR in particular, is the only sensible course to take if we value our collective future, and to persuade his readers to act to achieve this result.

On his way to this conclusion, Tribe touches all the bases from the implications of population growth through the prevalence of poverty and the prospects of growing enough food over the coming decades. He dwells particularly on the question of whether the environment can sustain the agricultural production that is required. He concludes that it can, if appropriate actions are taken. Tribe does not hesitate to quote doomsayers as a means of defining issues, but his usual conclusions are virtually all conditionally opti-

mistic. He is a strong believer in the rationality of society in the medium and longer term. "The time has come," he says in introducing his discussion of environmental issues, "when discussions about the environment need to have a more constructive, dispassionate, factual and even optimistic flavor." And later, ... "the world has never been in such a precarious position as it is today — nor has it ever had better prospects of solving the problems with which it is beset."

Tribe goes out of his way to achieve a balance of evidence. He agrees that serious problems of erosion exist, but points out that there is uncertainty and disagreement about how much impact land degradation has had to date. More long-term research on the causes, extent and consequences of soil erosion is badly needed, and meanwhile sweeping generalizations should be avoided.

Having set forth the problem, and shown that knowledge is a major requirement for dealing with it, Tribe describes the structure, accomplishments and problems of the agricultural research institutions as they exist. This part of the book is comprehensive and informative. It is full of descriptions of research accomplishments which are well told and interesting. It is also crowded with forward references to Chapter 13, titled "Who Pays," since almost the entire research structure suffers from inadequate and shrinking budgets.

Before getting to that topic, however, Tribe discusses how the benefits are distributed. He identifies the benefits in terms of faster development, fewer environmental problems, a larger supply of food with positive implications for the poor, an improved lot for the farming community, and as in the case of Australia, economic returns to the donor countries.

Tribe ascribes an important role to the private sector, but his view of who pays is clearly set forth by his last chapter, which follows a discussion of where the money has been coming from, and the difficulties presently faced in providing it. Here, the reader finds two letters, each of which puts the whole case in a length of two pages, the maximum Tribe considers appropriate for busy decisionmakers. One letter is addressed to "Minister for Finance and Planning, Government of the South," and the other to "Minister for Overseas Development Assistance, Government of the North."

A skillful and persuasive writer, Tribe also has a knack for picking the apposite quotation. For example he quotes Sara Scherr of IFPRI on the difficulties faced by researchers and NGO activists in understanding each other enough to collaborate effectively. The research culture “values critical analysis and ruthless honesty and demands emotional distance between a person and their work” while that of the NGOs “places greater value on relationships, seeks to honour others’ experience, and uses learning-by-doing (i.e. discovery and sharing of one’s own mistakes), rather than expert criticism.”

The book is attractively presented, but contains some typographical errors and other signs of haste. A table of “organizations established by donor countries to assist international agricultural research” lists several institutions that mainly perform research themselves rather than provide assistance, and other organizations with a much broader remit than agriculture. The same table lists the Special Program for African Agricultural Research (SPAAR) as a US government initiative, when in fact it is led by the World Bank.

Inevitably, in a work as wide ranging as this one, there are some sections that do not meet the overall standard. In presenting issues related to the patenting of living organisms and the possible dangers of

genetically engineered plants and animals, for example, Tribe quotes various conflicting views without getting to the core of the issues, or leading the reader toward the possibility of thinking systematically about these difficult questions.

For the specialist in global agricultural issues, this book is not a source of new information, but rather an attractive reminder of how the case for doing more can be put forcefully and effectively. For the more general reader open to persuasion, it will be a valuable survey of the ground, and perhaps a step toward engagement.

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