

food and water pollution, noise vibration and radiation. The section dealing with the planning, pre-testing, and conduct of studies is rich in detail. A particularly attractive feature of the text in general is the inclusion of examples covering a range of environmental hazards in a variety of international settings, including the Third World.

Although the cohort study design is adequately covered, the material included on the case-control study is cursory and contains some inaccurate information; for example, it is erroneously stated that the odds ratio only approximates the rate ratio. Further, other than for information quality, the major biases that threaten the validity of observational studies are not dealt with in sufficient detail. For example, confounding is not formally defined until the end of the book. The analysis section provides a comprehensive overview of techniques available; however, a practitioner will have to refer to supplemental textbooks for additional information.

This book will be of value to those scientists without extensive training in methodology who are faced with organizing research on environmental hazards in a variety of field settings. The editors are to be congratulated for melding the multiple individual contributions into a surprisingly well-integrated text.

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UNDERSTANDING GREEN REVOLUTIONS: AGRARIAN CHANGE AND DEVELOPMENT PLANNING IN SOUTH ASIA. *Essays in honour of B. H. Farmer.*

Edited by Tim P. Bayliss-Smith and Sudhir Wamali. Cambridge University Press, Cambridge and New York. \$59.50. xi + 384 p.; ill.; index. 1984.

This is a volume of 18 papers issued to honor the geographer and South Asianist B. H. Farmer on his retirement from Cambridge University. Rather than bemoan the topical scatter typical of festschrift volumes (a third of the contributions are only tangentially relevant to its title), it is more useful to identify those papers that offer the interested scientific reader succinct perspectives into current research on agricultural development policy and progress. Agrarian change on the Indian subcontinent has in fact been Farmer's career interest as researcher and administrator; ten years ago, he directed an extensive evaluation of Green Revolution progress in Sri Lanka and a region of south India, which resulted in the influential (and pessimistic) 1977 volume, *Green Revolution?*. One opens the present volume wondering if the absence of the doubting question mark signifies that Farmer's students and colleagues now see improved prospects for agrarian reform. In short, no: the picture remains bleak.

Griggs' opening paper reviews historians' alternative conceptions of when and in what manner Europe experienced an agricultural revolution; he uses measures of input/output to argue that only output and productivity increases since 1930 merit such a description. Clifford Smith follows with a review of land reform programs in Latin America from the early 1950s through the early 1970s, which he regards as a closed chapter of mixed reformist and radical initiatives, all of which have largely failed for legislative, organizational, or resource deficiencies. Christopher Baker then addresses the charges that the Green Revolution has not happened in India ("more ballyhoo than bread") or that it has produced only scattered regional successes. His survey of the country's 20th century agricultural history suggests growth had occurred earlier but was fitful and localized; Green Revolution progress have brought further improvements to regions of previous growth but few benefits to other areas, such as the Tamil Nadu district that Bradnock (chapter 7) reports on.

Several of the case studies that follow these general essays substantiate other common indictments of the Green Revolution in South Asia. Bayliss-Smith (chapter 8) models energy flows in the agricultural system of a south Indian village in the 1950s and 1970s to show its increasing energy inefficiency. Jones (chapter 10) argues that gains from the HYV package in an area of Bangladesh are limited only by the small scale of rice farming but by the pervasive sharecropping, although prospects for effective tenancy reform are dim. The Samarasinghes (chapter 9) trace the emerging inequalities in a Sri Lanka dry zone settlement to variable pressures to subdivide holdings among sons. Both Madduma Bandara (chapter 15) and J. Harriss (chapter 16) focus on another problem in these dry zone project settlements: poor water management by farmers and officials in the new irrigation systems. Indeed, in recent years, water management issues have become central in both Green Revolution scholarly research and project investment.

The volume concludes with its best chapter, a synoptic and programmatic essay by Robert Chambers that identifies several pressing topics for research and action: water use procedural reform, access to common property resources, farming systems studies for neglected subsistence crops. To Chambers, the seriousness of food production and rural poverty problems do not permit the luxury of pessimistic handwringing nor condone the starry optimism of technical wizardry—perspectives, he feels, that too often divide social and biological scientists. His pragmatic eclecticism contrasts with the other contributors, but his plea for research that is responsible to the poorest

makes it imperative that we give due consideration to their sombre assessments.

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ENVIRONMENTAL MANAGEMENT IN TROPICAL AGRICULTURE. *A Westview Replica Edition.*

By Robert J. A. Goodland, Catharine Watson, and George Ledec. Westview Press, Boulder (Colorado).

\$17.50 (paper). x + 237 p.; ill.; index. 1984.

In recent years, there has been a growing concern over the rapidly deteriorating environmental state of affairs in tropical countries. This concern, though a bit late in coming, is shared by many temperate- and tropical-zone scientists and is clearly a hopeful sign that progressive action may occur. Most of the apprehension is over the destruction of tropical forests and the dwindling of the genetic stock of wild populations. Whereas the focus of concern is on natural systems, there seems to be a common sentiment in the literature that agricultural practices have been greatly responsible for much of the destruction of tropical forests. Although the important linkage between agricultural practices and forest destruction must be acknowledged, relatively little attention has been given to the conservation consequences that might result from the development of an ecologically sound tropical agriculture. This slim volume therefore, is an important contribution not only to the obvious need to develop sustainable agriculture but also to tropical conservation in general.

The book is divided into four major sections. The first section deals with basic food crops, mostly produced on small farms, and places a primary emphasis on cereals and legumes. Common cultivation practices are reviewed and some discussion of specific problems is given. The second and third sections deal with cash crops and with livestock. Because of the capital-intensive nature of these production systems, the authors place somewhat more emphasis on large commercial operations. The fourth section deals with an array of production factors, such as biocides (the authors' apt term for all pesticides), fertilizers, and irrigation, among others. This last section represents approximately one-third of the total text. The authors develop a strong case for the negative contributions that many current production practices make to the major environmental problems in agriculture. They leave little doubt that many practices are simply exchanging short-term production gains for the loss of long-term sustainability.

Although this book cannot be all things, it does suffer from one important deficiency. The litany of environmental abuse in tropical agriculture is of-

ten not well balanced with an adequate treatment of possible alternatives. An example of a better presentation is the chapter on the use and mis-use of biocides as a production factor that is (properly) followed by the chapter on integrated pest management as a useful alternative. Unfortunately, that kind of balance is lacking in much of their treatment of environmental problems in agriculture.

The authors have presented a good overview of much of the abuses of technology in tropical agriculture. They are to be commended for this lack of scale-bias. They avoid both overly romanticizing the ecological practices of subsistence farmers and categorical rejection of commercial practices. However, their focus on the technological side of environmental issues in agriculture may be somewhat misleading.

The authors explicitly restrict their discussion of environmental problems to the farm itself, and largely avoid the argument that environmental problems that occur inside the farm gate are partly a consequence of the larger problems that are created by farming systems and powerful political and economic forces. For example, many of the environmental difficulties that are created by small-scale farmers who grow basic foods must have something to do with the occupation of the best farmlands by highly commercialized cash-crop operations; and problems of biocide contamination in the tropics partly results from the marketing and production strategies of multi-national biocide manufacturers. The authors clearly recognized the significance of these important exogenous factors but chose not to treat them explicitly in this volume. Arguably, a critique of the relationship of political economies to agricultural practices is more the domain of a work in rural sociology or economics. The counterargument, however, is that the magnitude of the dismal environmental problems is a result, in part, of ecologists and agronomists pretending that they develop technologies and management practices that are politically and economically unbiased. The greater solutions to environmental problems in tropical agriculture do not lie in the promotion of particular technologies that appear ecologically benign, but rather will grow out of explicit analyses of the social and economic dimensions of such technologies.

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ETHNOBOTANY IN THE NEOTROPICS. *Proceedings of Ethnobotany in the Neotropics Symposium, Society for Economic Botany, 13-14 June, 1983, Oxford, Ohio, USA. Advances in Economic Botany, Volume 1.*