Ind. Jn. of Agri. Econ.
Vol. 53, No. 4, Oct.-Dec. 1998

Book Reviews

Farms, Trees and Farmers: Responses to Agricultural Intensification, Edited by J.E. Michael Arnold and Peter A. Dewees, Earthscan Publications Ltd., London, U.K., 1997. Pp. xii+292. £ 16.95.

This edited book contains ten chapters written by various authors based on the research studies conducted in Eastern Africa and South Asia. The chapters are organised in four parts. The introductory chapter of the book sets the overall view of the various issues related to tree growing within farms. The author questions some of the popular assumptions like poverty alleviation and afforestation as the major goals of tree growing programmes in the farm land.

In Part II, the responses of farmers in Nepal, India (Rajasthan), Pakistan and Eastern Africa are explained with some specific examples. The authors explain clearly the gap between assumptions held by the planners and how differently the farmers have responded to various policy interventions. The chapter by N.S. Jodha brings out the role of indigenous models in managing the common property resources. The chapter on Nepal tells us how in spite of the generally believed 'Theory of Himalayan Environmental Degradation', the density of trees in the farmer's field is on the increase.

The chapters in Part III deal with some of the critical issues on the factors influencing the farmers' decision to grow trees. In the chapter on 'Farmer Responses to Tree Scarcity: The Case of Woodfuel', Peter Dewees raises many questions on the woodfuel orthodoxy. He clearly establishes the weakness in the underlying assumptions of the various tree planting programmes. The concepts of 'economic' scarcity and 'physical' scarcity are explained well, indicating the gap in our understanding about the difference between the two.

The comparative analysis on the role of wood product market in inducing the farmers to grow trees and its impact in three countries (India, Sudan and Kenya) provides enough materials for the planners to take some clear guidelines. In the final part, J.E.M. Arnold summarises the results of the various studies which may help to refine the existing hypotheses on farmers' response to tree growing programmes in the field.

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Natural Resource Economics: Theory and Application in India, Edited by John M. Kerr, Dinesh K. Marothia, Katar Singh, C. Ramasamy and William R. Bentley, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 1997. Pp. xxxvi+636.

Sustainable development and use of natural resources have come to occupy the central stage in the planning process of many developing countries. Underlying socio-economic and political nexus across space and time makes it imperative to adapt and apply methodologies to internalise the natural resource-related concerns in countries like India rather than importing the experiences from developing world for direct application. Ironically, the expertise in natural resource economics, though expanding in recent times, remains inadequate to match with the emerging challenges. Encouragingly, more thrust towards such

newer areas of concern is emphasised as evidence in the restructuring of the curricula of agricultural education in the national system, which is currently underway.

The book under review is a pro-active response from a group of researchers with rich natural resource expertise who have visualised the emerging demand from both academic and research-based social science community in natural resource economics. More importantly, the editors of the book have brought together a core group of 34 natural resource economists, mostly from India and drawn natural resource management related experiences and examples from different regions, again mostly from India.

The book has five sections dealing with introduction, concepts, research methods, applications and conclusions. Each section is divided into several themes related to environmental and natural resource management and each theme is contributed by different authors. Each theme area is covered under several sub-themes, besides having a set of discussion questions along with related references for further reading. The format of the book, coverage of the topics and presentation are thus appropriately designed to cater to the needs of the student community. However, regional natural resource related problems, experiences and perspectives are intertwined in a common conceptual and analytical framework of the natural resource economics making it equally appealing for meeting the demands of the expanding natural resource researchers also.

The introductory section deals with the natural resource policy and management problems in India. John M. Kerr and R. Swarup set the underlying theme of the book from policy, institutional, managerial and analyst's perspective for diagnosing the natural resource-related problems and applying economic principles for better management.

Conceptual understanding of the economic analyses of natural resource management related problems is focused in the second section. The uniqueness of spatial variability in natural resource management and its implications in the context of the role and performance of selected market structures, policy induced distortions, failures, interventions and externalities are comprehensively discussed by John M. Kerr, C. Ramasamy and T.R. Shanmugam. The temporal allocation of natural resources and consequent management issues warranting risk and uncertainty analyses are highlighted by Douglas Lober and C.P. Gracy. The complexity of different categories of property rights and their individual and collective impacts on the ownership, use and exploitation of natural resources that are currently aggravating the degradation of natural resources following the rigidity in rules and regulations are lucidly presented by Katar Singh while emphasising for a collective, sustainable and equitable management and use of these scarce resources. Internalising the social and environmental impacts into the evaluation of public funded projects in a quantitative, social accounting and qualitative information-based framework is described by William R. Bentley and Suresh C. Tewari.

Methodologies for addressing researchable areas of conservation, management and use of natural resources is dealt with in the third section on Research Methods. Synthesising information on the management of natural resources and how it has evolved over a period of time can best be handled via participatory learning methods and the conceptual and

technicalities of this approach are highlighted by Gerard J. Gill. William R. Bentley and Craig W. Shinn extend this further by discussing and illustrating the application of causal and contingency analyses as the precursors for quantitative analysis of natural resource management in India. Having founded the qualitative basis for developing analytical framework, appropriate descriptive and inferential statistical methods and their usage in evaluating the multiple impacts of natural resource use and management are put forward by Donald L. Grebner and William R. Bentley.

Several case studies and examples of Indian natural resource management problems are the distinguishing features of this book, which are listed in the fourth section on Applications. Management of common property resources (CPRs) is illustrated from the experiences drawn from selected dry areas of India. N.S. Jodha succinctly argues the spatial impact of public interventions across villages and resources resulting in CPR decline and prospects for future management and regulation of CPRs. The story of Sukhomajri and Nada watersheds remains a few of the bright spots in the conservation management. The watershed specific developmental problems in general and non-spread of few successful experiments to saturate the remaining problem areas are the issues covered by Toral Patel-Weynand. The management of salt affected and waterlogged soils and related Indian experiences in terms of government interventions, their effects and lessons for future is discussed by P.K. Joshi. Groundwater related accessibility, determinants, usage in conjunction with surface water sources like tank and exploitations from the point of view of multiplicity of stake holders involved in the process are brought out with illustrative applications from the Karnataka experiences (John M. Kerr, M.G. Chandrakanth and R.S. Deshpande) and Tamil Nadu examples (K. Palanisami and C. Ramasamy). The richness in the coverage of diverse problems in the area of resource management has enhanced the utility of this publication for the readers. For instance, institutional arrangements for common village fish ponds, their management implications under different property regimes and resultant productivity and equity impacts falling under the watershed of selected developmental agency are lucidly illustrated by Dinesh K. Marothia. Such examples for identifying, hypothesising and addressing natural resource management problems in the Indian context, by and large, include marine fisheries-related, non-timer forest products-related, horticulture-related, silviculture-related, pesticide externalities-related and ecosystem-related illustrations which are thoughtfully sequenced to sustain the interest of the reader. However, natural resource-related institutional issues which are specific as well as dynamic in nature across space and time depending upon the social, cultural, economic and political ethos received less emphasis in the overall coverage possibly due to lack of adequate and reliable documentation in the past.

The authors have appropriately concluded the book by restating the roles of natural resource economics theories and methods while summing up the need for client-driven policy analysis for India's natural resource policy makers in the concluding section. This book, the first of its kind in terms of compiling the concepts, methods and applications in the field of India's natural resource-related conservation, use and management issues and subjecting them to economic treatise, is both timely and useful addition for the students, researchers, planners and policy makers alike.

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Foodgrain Economy of India: Government Intervention in Rice and Wheat Markets, Pradeep K. Sharma, Shipra Publications, Delhi, 1997. Pp. viii+160. Rs. 280.00.

The book under review reports a study undertaken by the author to examine the functioning of foodgrain markets in India with particular reference to the forms of government intervention in Indian rice and wheat markets. The author has attempted to simulate the rice and wheat economy and based on this exercise, tried to compare certain policy options in Indian rice and wheat markets. The book has been divided into seven chapters. In the first chapter, the author briefly traces the history of government intervention in Indian foodgrain markets.

In Chapter 2, the author claims to have analysed agricultural prices and price policy in India. However, there are some loose and factually incorrect statements which may mislead the reader. Though the objectives of agricultural price policy, as pursued in India, have been clearly spelt out in the Terms of Reference of the Commission for Agricultural Costs and Prices (CACP) (prior to 1980, it was called Agricultural Prices Commission), the author has formulated the objectives at his own. Not only this, he goes on to state that the price policy is not the best means to achieve some of these objectives formulated by him. While making such statements it ought to be recognised that the agricultural price policy in India since the mid-sixties has been used as one of the three foundations of building a sound agricultural economy, the other two being provision of a technology package and creation of an efficient system of delivery of inputs and services including credit to the farmers. It was never claimed that price policy in isolation of other two foundations would achieve the objectives. Further, contrary to what the author states, the CACP was never asked by the government to relate the minimum price to the cost of cultivation. (Perhaps the author is aware of the distinction between cost of cultivation and cost of production.) The terms of reference of CACP implicitly mentioned by the author on page 15 (para 2) pertain to the period till 1980. A very important change in the terms of reference of CACP was introduced in 1980 when the balance between the demand and supply of foodgrains was in sight. In the Terms of Reference of CACP the objective of 'maximising production' was replaced by "evolving a production pattern in the light of national requirements" (Acharya and Agarwal, 1994). Again in para 3 of page 15, there are two factual errors in the statements made by the author about the minimum support price (MSP) announced by the CACP. First, the CACP never announces MSPs. It is the Government of India which announces the support prices. Second, the MSPs are not related to only the cost of production. On pages 16-17 again, the author has missed the important change made in 1980 in the terms of reference of the Commission. The statement of the author in the last sentence of para 2 on page 19 that the CACP recommendations are now based on cost C3 is also factually incorrect. The CACP, while recommending the level of support price for a crop, takes into account several concepts of cost of production, including C3, besides other relevant factors. On pages 23 to 26, the author has worked out nominal protection coefficients (NPCs) based on procurement prices. The fact that procurement prices were not the average prices realised

by the farmers for rice and wheat, suggests that the NPCs based on such prices are misleading.

In Chapter 3, the author discusses the structure and growth of rice and wheat economies, along with the supply and demand for these foodgrains. Most of the analysis in this chapter pertains to the period upto 1989-90 whereas considerable change has occurred since then in the nature and form of instruments of market intervention for foodgrains in India.

Government operations in rice and wheat markets, i.e., procurement, public distribution, buffer stocking and imports are discussed in the fourth chapter. The author discusses several instruments and restrictions which are no more in existence now. For example, the movement restrictions on wheat have been withdrawn. The levy on rice millers is not necessarily a coercive measure. Since 1991 *kharif* season, there is no system of procurement of wheat and paddy. Whatever quantities purchased by the public agencies are price support purchases. Further, the author has attributed expansion in area under rapeseed-mustard (at the cost of wheat) to the movement restrictions imposed by the government during the peak marketing period of wheat. In this connection, it ought to be recognised that the shift from wheat to rapeseed-mustard occurred at the margin and in those regions where irrigation facilities available to the farmers for taking a wheat crop are inadequate. Such shifts at the margin are taking place even after the movement restrictions have been withdrawn.

The author has also analysed the cost of Food Corporation of India (FCI) operations and tried to relate this to the volume of food subsidy. The author has perhaps ignored several relevant aspects. For example, while he has shown the concern for rising cost of FCI operations, the cost of carrying buffer stocks in real terms have not been estimated. Further, a considerable part of FCI cost was either market determined or administered by other agencies. On the same basis, the comparison of economic cost with procurement price (page 101) and treating the difference as FCI's mark-up is misleading. Similarly, comparison of FCI's economic cost with open market wholesale price and using this for comparing the efficiency of FCI vis-a-vis private trade is also misleading, particularly when the statutory charges constitute a sizeable proportion of the marketing cost. It ought to be recognised that a public or co-operative agency cannot evade the statutory charges whereas the private trade can. The statutory charges payable by the FCI in Punjab markets, in recent years, have been as high as 12 per cent. For looking at the efficiency or otherwise of FCI in handling foodgrains, one should look at the structure of cost of FCI vis-a-vis private trade. (For details of FCI's economic cost and its implications about the efficiency of FCI, see Acharya, 1997.) If both the issue price and purchase price are administratively determined by the government, and when more than 71 per cent of the cost incurred by the FCI is beyond its control, and open market sale/purchase decisions are dictated by the Ministry of Food, how can the FCI be held responsible for the subsidy outgo ? It has been shown elsewhere that the food subsidy is not the subsidy to the FCI (Acharya, 1997).

In Chapter 5, the author has presented a simultaneous equation model. In this model, while the administered prices, both support and issue prices, were endogenised, input prices and in turn the cost of production were hypothesised as exogenous to the system. The model includes 14 behavioural relationships and 21 identities or definitions with 35 endogenous variables, 16 lagged endogenous variables and 23 exogenous variables. All relations were specified as linear and the system was estimated through three-stage least squares (3-SLS) method. There are quite a few errors of specification of the model. For example, though the determination of the level of support price for a commodity is based on a large number of factors, which the author has listed on page 17, he has specified a simplistic relationship with C2 cost and wholesale price index as explanatory variables. It must be known that while the level of support price is arrived at prior to the sowing season of a crop, the cost of production estimates for that crop are available after one to two years of the harvest.

Further, the effect of several other factors (unexplained variation) which are not included in the model by the author, cannot be ascribed to the political factors. For example, in some years, the inter-crop price parity assumes more importance in deciding the level of support price. The point which needs emphasis is that the level of support prices are not arrived at by any mechanical linkage with any of the factors which are considered relevant.

In the last two chapters, the author has discussed the policy implications and used the results of this study to predict the impact of hike in fertiliser price on output and procurement of rice and wheat. He has also used the results to find out the effect of increase in irrigated area on output, procurement and other variables. How an over-simplified model formulation and decision rule (page 138) lead to trivial prescriptions which ignore the inter-regional heterogeneity in production conditions is best illustrated by the suggestions being made by Sharma. It is well established that irrigation is a critical input in crop production and is capable of shifting the production function. Further, a very high degree of complementarity between irrigation and other yield-raising inputs is also well established. Nearly 80 per cent of the farmers now use fertilisers. Fifty per cent of unirrigated lands also now receive fertiliser application (Desai and Rustagi, 1991; Rao and Gulati, 1994). The fertiliser users include small and marginal farmers, most of whom either do not have marketed surplus or sell only a part of their output in the market. Further, all the fertiliser users are not doing farming in those regions where price support purchases become necessary and are undertaken by the public agencies every year. The model formulated by the author does not capture these variations. Moreover, the possibility of irrigation expansion does not exist on all the fertiliser using farms. Given the degree of inter-farm and inter-regional differences in production conditions, the policy prescription emerging from Sharma's results, if implemented, may have serious implications for food security of small and marginal farmers and agricultural labourers; inter-personal disparities in incomes and for inter-regional differences in development.

Notwithstanding these limitations, the model formulated by Sharma provides a useful base for expanding and reformulating the model to bring it close to reality so as to answer many such questions which relate to the equity and household food security; levels of input and other subsidies; freeing of trade in foodgrains; continuation of price support mechanism; and retention of food management system in India.

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Measurement of Inequality and Poverty, Edited by S. Subramanian, Oxford University Press, Delhi, 1997. Pp. viii+369. Rs. 545.00.

Economic growth with reduction in inequality and poverty is one of the prime objectives of most of the developing countries. However, economic growth alone does not necessarily ensure removal of poverty; on the contrary, it may aggravate the level of inequality leaving absolute poverty mostly unaffected by growth. In order to assess all this efficiently so that appropriate policy measure can be evolved and prescribed, considerable amount of work has been done on issues related to the development of poverty.

With a somewhat long but highly interesting introductory note the volume under review compiles a series of thirteen papers already published over the decades in various journals and edited volumes. So much well-known and extensively referred some of these papers are that one starts wondering, what additional benefit does it serve by recollecting them in another volume? The answer is simple: one would realise the need of piecing them together if the editor's introduction, which identifies distinctly the common thread inter-connecting these papers, is carefully read.

Six important themes, if one may say so, constitute the essence of the volume: (i) measuring income inequality, (ii) inequality and development, (iii) measuring poverty - identification aspect, (iv) measuring poverty with emphasis on issues related to aggregation, (v) poverty redressal and (vi) non-income dimensions of deprivation.

The paper by Henry Mayhew, without really going into the technicalities of measurement issues, focuses on the vulnerability of dustmen in London in the nineteenth century. One of the most celebrated papers in the field of inequality is the one by Lorenz, which was published way back in 1905. The main concern in this paper is to evolve a technique that would enable a social scientist to identify if the present distribution in the society is becoming more (less) unequal as compared with the past situation. Having poined out the limitations of some of the measures suggested by them, his paper highlights the importance of Lorenz curve. A detailed review of various inequality indices is presented in the paper by S. Anand. Lawrence Haddad and Ravi Kanbur, on the other hand, investigate the possibility of under-estimating overall inequality if intra-household inequality is not taken into consideration. They present a framework in which such questions are addressed, and then apply the framework to a data set from the Philippines on intra-household inequality in nutritional status. Their conclusion is that the neglect of intra-household inequality is likely to under-estimate the levels of inequality and poverty. But an important point that needs mention is that although the patterns of inequality revealed by household level data are somewhat different from those revealed by individual level data, these differences are not dramatic.

In the context of inequality and development Kuznet's (1995) inverse - 'u' shape hypothesis is quite well-known. It suggests that in the initial stages of development there exists a positive relationship between per capita income and the level of inequality; only at higher stages of development inequality declines with further increase in per capita income. Sudhir Anand and S.M.R. Kanbur make a detailed scrutiny of this fact particularly in reference to Ahluwalia's (1976) work which extended support to Kuznet's hypothesis. The regression of the income share of the poorest 40 per cent against average per capita income for the cross-section of countries considered by Ahluwalia yields large differences, in terms

of R^2 and the threshold level, while tried with alternative functional forms. This in turn suggests absence of a stable relationship between the variables.

A.K. Sen in his paper, "Poor, Relatively Speaking" mainly deals with the identification problem as far as the measurement of poverty is concerned. He refers to the 'absolutist' versus 'relativist' debate on approaches to the identification problem of poverty. According to him, "despite the emerging unanimity in favour of taking a relative as opposed to an absolute view of poverty, there is a good case for an absolutist approach" (p. 116). And this absolute approach to poverty needs to be related to the notion of capability because an absolute approach viewed in terms of capabilities translates into a relative approach in the space of commodities, resources and incomes. Sen also makes a distinction between poverty and inequality, and his focus is on poverty within a country and/or community (rather than merely referring to inter-country or inter-community differences).

C. Gopalan's paper refers to the measurement of under-nutrition in population groups rather than individuals. The two approaches to the measurement of under-nutrition are (i) a survey of diets of representative households inclusive of individual members of the family in a sub-sample of households, and (ii) an anthropometric and clinical examination of children, especially those who are under five. Under-nutrition in the community can be captured, as Gopalan argues, in terms of these two approaches accompanied by a broad survey of socio-economic and environmental status of the community. However, (empirical) implementation of such a technique would entail a large financial burden on the researcher.

As far as the aggregation problem of measuring poverty is concerned, two important papers (one by A.K. Sen and another by James Foster, Joel Greer and Eric Thorbecke) have been included in the volume. The usual headcount measure of poverty fails to satisfy two basic axioms, namely, the axiom of monotonicity and the axiom of transfer. A reduction in income of a person already below the poverty line does not raise the poverty ratio. Further, the headcount measure is insensitive to the distribution of income among the poor: a transfer of income of a person below the poverty line to someone richer leaves the headcount measure unchanged. From this view point Sen's measure of poverty (P) is much superior to the popularly used headcount measure. However, Sen's measure, as argued by Foster *et al.*, does not satisfy the decomposability property, that is, an increase in sub-group poverty must increase total poverty. The poverty measure suggested by Foster *et al.* is applied to data from the 1970 Nairobi Household Survey to illustrate the usefulness of decomposability. Anand, for the Malaysian economy, estimates poverty using different indices, and provides a vivid profile of the poor.

The papers by Martin Ravallion and S. Guhan examine the effectiveness of employment programmes in reducing poverty. Direct interventions for poverty alleviation involve costs which may have to be incurred at the expense of growth or poverty alleviation programmes in the future. Ravallion mainly focuses on issues which arise in designing cost-effective relief work schemes including their two major aspects: the choice of coverage for the scheme and the choice of the benefit level to participants. Guhan reviews various protective and preventive forms of anti-poverty intervention including the provision of social security. The

last paper (Bhaskar Dutta, Manoj Panda and Wilima Wadhwa) in the volume revolves around the theme of non-income dimensions of deprivation and poverty in the Indian context. The focus is on human development and its association with per capita income and social sector spending.

The volume on the whole is a collection of priceless pieces and would be useful, particularly for the researchers.

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Strategic Change in Indian Irrigation, Edited by Mark Svendsen and Ashok Gulati, Macmillan India Limited, New Delhi, 1995. Pp. xxiv+368. Rs. 430.00.

Indian canal sector is now at a crossroad between a host of old challenges and new opportunities. The challenges are well known and are related mainly to the financial crisis, physical deterioration, and poor economic performance of the canal sector. The opportunities, not as obvious as the challenges, are basically related to the emergence of both endogenous and exogenous pressures for change in the way canal sector is financed, maintained, and managed. With the extension and consolidation of economic liberalisation policies, the canal sector cannot be immune to the forces of financial discipline, market-based approach, and decentralised decision structures. As the canal sector is approaching fast its ultimate expansion potential and the ever tightening budget and ecological constraints reduce the scope for further expansion, there is now an endogenous pressure for improving the economic and financial performance and realising thereby the hidden irrigation and investment potential within the canal sector. While the pro-reform climate provides new opportunities for pursuing canal sector reforms, the political economy constraints, though getting gradually relaxed, continue to remain still as a major hurdle for change. In the meantime, the literature is replete with studies trying both to expose the nature and magnitude of canal sector problems as well as to chart out strategies for improving the financial, physical, and economic performance of this sector. The volume under review is an important addition to this growing literature.

The book, an edited volume with contributions from 14 authors including the editors, is one among the outcomes of a six-year collaborative research programme of the Indian Council of Agricultural Research and the International Food Policy Research Institute. It has 16 chapters organised into five parts. The first part that provides the context for change covers two chapters dealing respectively what the editors call as a 'research based vision of the future' and a historical review of the evolution of the Sone command during 1850-1992. The second part covers three chapters that together deal with two interrelated issues in the particular context of major and medium irrigation systems, i.e., the estimation of their capital

costs and the recovery status of the operation and maintenance costs. The highlight here is the empirical application of an innovative methodology for obtaining more realistic and regionally disaggregated capital cost estimates for major and medium irrigation schemes.

The third part covers five chapters that empirically evaluate the following four broad issues, i.e., conjunctive use in the tank and canal regions, adequacy and timeliness of canal irrigation service, and the evaluation of canal farmers' strategies for coping with drought and water scarcity. The highlight in this part is the chapter that first develops an index of drought in an irrigation setting, known as the 'Relative Drought Status Index' and then empirically demonstrates its predictive capabilities. This index not only admits a distinction between 'meteorologic drought' and 'hydrologic drought' but also recognises the differential impact of hydrologic drought across water sources by explicitly incorporating the time lag between rainfall and its effect on the storage of different water sources.

The fourth part of the volume covers four chapters that all deal with various issues related to irrigation-induced salinity in canal regions. Among the issues covered in this part, the most important ones are the methodology used for estimating salinity-induced crop loss and the empirical evaluation of alternative options for managing soil salinity. The final part of the volume has two chapters dealing with the way forward for canal irrigation reform in India. The first among these two chapters evaluates the performance impact of joint management approach in two irrigation systems in Gujarat utilising actual data and simulated results. The last chapter, after a brief review of some of the management and cost recovery experiments both within and outside India, concludes with suggestions for improving the financial and management performance of the canal irrigation sector in India.

Being an edited volume, the chapters, though have an in-depth coverage of issues in various facets of Indian canal irrigation, remain loosely connected with the end result that it proves to be a collection of well researched individual papers rather than an integrated edited volume. Consequently, neither the 'vision' of a future canal sector envisaged in the introductory chapter percolates fully into the volume nor all the institutional reforms suggested in the concluding chapter flow directly from the previous chapters. A glaring case here is the idea of introducing a water rights system for canal regions as none of the studies included in this volume has investigated this issue in a way that it should have been. Despite these problems, the volume does have some notable contributions to make both on the methodological and policy fronts. Some of them can be noted below.

First, the volume presents a methodology for a more realistic estimation of the capital costs involved in creating a hectare of irrigation under major and medium schemes. A notable feature of this methodology is that it takes into account the cost effects of the hitherto neglected factors like social time preference, inflation, gestation lag, and scale economies. Utilising this methodology and project-specific data for 384 major and medium irrigation schemes in 10 major states of India over a 40-year period, it makes a first ever attempt not only in estimating the capital cost of canal irrigation but also in evaluating its regional and temporal behaviour. While the attempt is certainly innovative, there is a prescription for care in using these cost estimates for policy purposes. For instance, the differential capital

cost estimates (at 1988-89 prices) for Punjab (Rs. 8,695) and Tamil Nadu (Rs. 53,307) should neither be taken to mean irrigation creation is cheaper in Punjab than in Tamil Nadu nor be used as an argument for favouring Punjab in inter-state allocation of irrigation investments. This particular case illustrates also the cost effects of factors - such as the hydro-geological variations across regions and also over time - not included in the estimation methodology.

Second, the methodology and the empirical analysis used in Chapter 7 for the evaluation of the relative significance of adequacy and timeliness of irrigation supply is also interesting. So also is the approach used in Chapters 12 and 13 for the empirical evaluation of the inter-related issues of salinity-induced crop damages and the relative cost-effectiveness of alternative options for managing soil salinity. However, in both cases, there are few problems that severely limit the validity of some of the conclusions. In the first case, the problem is related to the context in which the relative significance of adequacy and timeliness of canal water supply is evaluated. Since the Sone command in the year of the survey does not have any problem of water shortage, the empirical result, i.e., the timeliness of canal supply is more important than its adequacy, remains less credible as a general result. Similarly, in the second case, some of the options considered for managing salinity such as sprinklers and drip systems, though empirically shown to be more cost-effective than other options, lack practical relevance in canal regions as pressurised and piped water distribution networks necessary for the adoption of these options are absent at present.

Third, one of the themes that pervades through this volume is the need for user-centred approaches for managing both water quantity and quality in the canal sector. There is a general consensus that the farmers' participation should not be in a paternalistic sense as done in the past but in the sense of them being equal partners sharing future management responsibilities. It is argued that the paternalistic view of farmers as 'beneficiaries' should give space for the healthier view of them being 'clients' of irrigation service for which they have to pay. Paralleling this view of users is also the emphasis on a new perception of irrigation departments as financially self-dependent and user-oriented commercial entities. Such a change in perception, though not easy, is a pre-condition for ensuring the two-way accountability between the users and irrigation agencies as envisaged in this volume.

Fourth, Chapter 13 dealing with joint management has an important message for improving the performance of canal irrigation through an institutional route. Since canal irrigation system is not just a hydrological or an engineering system but equally also an economic and social system, a mere focus on engineering goals could miss the economic and equity goals that are of importance to the users. Obviously, there is an indispensable need for integrating the socio-economic aspects with the technical aspects of irrigation management. Such integration - done through formal or informal communication channels - can ensure an effective flow of information between the users and irrigation officials and facilitate a consistency between the goals of these two main stakeholders of the canal irrigation system.

And, finally, while the need for an active involvement of the users in irrigation management is clear, it is presumptuous to expect them to come forward spontaneously. For this purpose, it is necessary to create a stake for each member because it is only with such an individual stake that a condition is created for collective action. The issue is not just to make them perceive and act on the common gains from co-operation but also to assure them that such gains will be shared equitably. In this respect, a system of water rights, if

conceived not only as a physical and organisational concept but also as a legal notion, has an important role to play. Since a water right system managed by the user groups provides an assurance for adequate and timely water supply, the users not only have a stake to participate but also perceive the link between water supply and the payment obligations.

With these methodological and policy highlights, let us leave the book to the readers who, we are sure, will discover it to be a very useful source material for further research and a valuable policy guide for developing strategies for reforming canal irrigation sector.

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Sustainability, Growth and Poverty Alleviation: A Policy and Agroecological Perspective. Edited by Stephen A. Vosti and Thomas Reardon, The Johns Hopkins University Press, Baltimore and London, 1997. Pp. xxii+407. $ 66.00.

The book under review is the outcome of the proceedings of an international conference on links among agricultural growth, poverty alleviation and sustainable use of natural resources in rural areas of the developing countries, sponsored by the International Food Policy Research Institute (IFRI) and the Deutsche Stifting Fur International Entwicklung (DSE) held in Germany in October 1991. Social and physical scientists and policy makers have contributed to this volume. The book examines the nature of links between poverty and environment and between growth and environment; policies, technologies, institutions; and other factors that condition these links. The complementaries among these links are quite complex and the implications of policies, technologies, institutions, population growth, and climate change differ across countries and agro-ecological regions in the short and the long run. The insights provided in this book increased the compatibility between the links (agricultural growth, poverty alleviation and sustainable use of natural resources) and policies, technologies and institutions. The book basically focused on rural households and communities who are important natural resource users and managers.

Divided into two parts, Part I of the book (Chapters 2 through 12) discusses the concept of sustainability and examines the links between sustainability, growth and poverty alleviation and factors conditioning these links. Part II (Chapters 13 through 23) examines the nature of links in relation to policy, technologies and institutions across the countries and agro-ecological regions. Chapter 24 summarises the insights this book has provided on the issues of links and agriculture and policy research gaps. This reviewer has chosen to review the key findings concerning the nature of the links and their determination, implications for design of policies, technologies, institutions, agro-ecological characteristics and gaps in research and policy knowledge, rather than chapterwise discussion.

The concept of sustainability, adopted throughout this book, focuses on sustaining livelihoods of the rural poor from crop, livestock, agro-forestry and output obtained from common pool resources and other non-agricultural activities. Further, the sustainability

concept used here does not necessarily imply 'small scale' or 'low input' agriculture or any particular natural resource base, crop mix, production techniques or scale of operation. Sustainable livelihoods can be earned in activities that use large or small scale, with techniques intensive in external input or not. Several issues emerged from the papers discussed about sustainability and agricultural growth links. These are: how to sustain and enhance agricultural growth without degrading natural resource base; how to continue sustainability with intensification of agriculture and reduce pressure on common pool resources; how to diversify economic activity and product mix on farms and how to minimise externalities of the decisions made by households and communities beyond their farms and common areas. The poverty-environmental links and the use of natural resources are also focal points of several chapters. The following policy issues were drawn in these chapters - increased poverty is inevitable if resource base sustaining life of the poor is degraded and adequate investment on restoration and conservation are not made; the poverty and environmental links depend on the composition of assets held by the rural poor and the types of environmental problems they face, and on policies and extent of natural resource management. technologies and their costs. Analysis of the links between environmental degradation and human health indicate that in the case of intensified agriculture transformation process innovative policies, technologies and institutions (within and outside the agricultural sector) are required to provide better sanitation, access to clean water and control of diseases.

Several factors are identified by the contributors in this book which play significant roles in conditioning the links among sustainability, growth and poverty alleviation. These include policies, technologies, institutions, population pressure, agro-climatic characteristics and climatic change. The decision pattern of rural households and communities and bio-physical-socio-economic environment under which decisions are made can affect policies (trade, macro-economic, sectoral, sub-sectoral, natural resource policies and population policies) technologies and institutions. Several authors have discussed the effects of these policies, technologies and institutions at national, sectoral, sub-sectoral and communities levels. For example, how trade policies can affect overall economic behaviour of large group of producers and consumers, which in turn affects the environment?; how policy influences resource utilisation decisions at household and community levels?; what determines 'resource conservation investment and productivity investments'?; how institutional innovations can improve security and transferability of resources?; how to improve the management of commons? and how non-price and price factors can affect the key links of growth-sustainability-environment? Several authors have concluded that a key challenge is to design technologies that simultaneously meet growth and sustainability goals - 'overlap technologies' that can be adopted and efficiently used by every section of the farmers. Adoption and sustained use of overlap technologies may require improving short-term profitability consistent with food income and basic needs, management skills and capital consumption, increasing access to rural credit, quality extension services for promoting these technologies and public investment in supportive service network. Similarly, institutional framework is needed in property rights, wealth distribution and risk sharing arrangements in the community. Many chapters emphasised population pressure and its effects on environmental degradation. The authors have suggested that family planning complements rural development. Several authors discussed the effects of agro-climatic factors on the nature and potential, as well as the limits of agriculture. The authors have

agreed that agro-climatic conditions are critical linkages for achieving development goals.

However, the effects of climatic changes differ by agro-ecological zones. In the last chapter, the editors highlight certain key approaches to development strategy. Based on the findings of the chapters in this book, the editors have concluded that environment, agricultural growth and poverty alleviation are closely linked and these goals have to be pursued simultaneously. These links are conditioned by complex interactions among policies, technologies and institutions. Innovative approaches are needed to promote 'overlap technologies'. Keeping in view the rural households and communities as key actors, the editors of the book have spelt out the following areas of future research: empirical research on the links between environment and poverty; innovative technologies to match agricultural growth and population growth rate; policies and institutions for effective adoption of overlap technologies; investment patterns and food security strategies on farm and non-farms, design and implementation of innovative, effective and efficient complementary policies and institutions, roles of private sector, communities, non-governmental orgnisations; the state and donor community in financing complementary investment; bio-physical data analysis for depicting natural resource use patterns; links among agro-ecological zones and between more-favoured and less-favoured regions and focus of the national and international research institutions without disrupting traditional research network.

The book is a significant contribution to the area of sustainability, growth and poverty alleviation. All the contributors have done a remarkably good job to analyse and illustrate the interactions between agricultural growth and environment and between environment and poverty and to highlight the implications of these interactions for development policies, agricultural technologies and social and economic institutions. This book, therefore, will be useful to policy makers and researchers who are engaged in designing strategies for achieving effectively the goals of sustainability, growth and poverty alleviation in the developing countries under diverse agro-ecological environments.

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