The Australian Journal of Agricultural and Resource Economics, 48:3, pp. 557–568

Book reviews

Selling Forest Environmental Services: Market-based Mechanisms for Conservation and Development, by Stefano Pagiola, Joshua Bishop and Natasha Landell-Mills (eds). Published by Earthscan Publications, London, UK, 2002, pp. xix + 299, ISBN 1 85383 889 6 (hdbk), £50.

This book provides an excellent review of market-based mechanisms (mostly tradable permit systems) for environmental services associated with forestry and watershed management. These mechanisms are viewed as a means by which those generating environmental services can be compensated by beneficiaries, incentives can be created for forest conservation, and a new source of income can be provided for rural communities.

Of the 15 chapters, each with their own authors, most present case studies, although Chapters 1, 2 and 15 provide overviews. The case studies deal with watersheds (or catchments), wetland banking, biodiversity conservation and bioprospecting, privately protected areas, ecological taxes and carbon credits. The papers are drawn from around the world, most from developing countries, but some from the USA, Canada and Australia.

The foreword notes that the volume contains 'a wide-ranging sample of the growing number of cases in which ecosystem services are finding real markets and real revenue flows. … It touches on the diversity of mechanisms, from self-organized private deals and open trading schemes to public payment schemes', and argues that the case studies signal a dramatic shift in the way society manages its natural assets.

The editors set up the issues surrounding tradable permits for ecosystem services in Chapter 1, and review the various case studies in Chapter 15. It is noted in Chapter 1 that about 300 examples have been identified throughout the world of experiments with market-based approaches to providing incentives for conserving forests and their public good benefits. Forest services are classified as carbon sequestration, biodiversity protection, water purification, reduction in sedimentation, and production of fuelwood and non-timber products, although salinity mitigation is not included. The case studies chosen represent some of the more advanced experiments, with a focus on three benefit classes, namely; watershed protection, biodiversity conservation and carbon sequestration. Chapter 2 by Bishop and Landell-Mills provides an overview of the environmental services generated by forests, and benefit valuation, with respect to these three service classes.

Pagiola (Chapter 3) provides details of a formal, countrywide system of payments for water services of forests in Costa Rica. These services, typically enjoyed by people distant from the forests that generate them, include reduction of sediment loads, regulating the timing of water flows, increasing flows in dry seasons, and improving water quality. In the Costa Rican initiative, payments have been made to watershed land users by electricity companies at a rate of $US42/ha per year for reforestation and forest management activities. The performance of this program was somewhat disappointing, with only about one eighth of the targeted 200 000 ha of land management activities financed from water service payments between 1997 and the time of writing (2002). Kerr (Chapter 4) also presents a watershed case study, for Sukhomajri in Haryana state, India. Ponds were established in the upper catchment to reduce downstream siltation, with all households sharing equally in the ownership of the ponded water and being able to sell water rights. Echavarria (Chapter 6) outlines experiences with financing watershed conservation in Equador, through an independent water fund financed by a 1 per cent tax on sales of drinking water.

Salzman and Ruhl (Chapter 5) note the development pressure on wetland areas in the USA, and the presidential policy of no net wetland loss. Through 'wetland mitigation banking', a stock of wetland habitat is formed (through wetland creation, restoration or preservation), and developers must purchase habitat mitigation as a condition for development approval. The legal and institutional aspects, and advantages and limitations of the program, are reviewed.

Pagiola and Ruthenberg (Chapter 7) discuss a mechanism that harnesses 'consumers' willingness to pay for conservation by inducing them to pay a premium for biodiversity-friendly shade-grown coffee in Mesoamerica.

Corcuera, Sepúlveda and Guisse (Chapter 8) examine the potential for privately protected areas (PPA) to complement public land conservation in Chile. In 1999, 93 properties with an aggregate area of 325 000 ha were listed in a national PPA network, including private parks (38 per cent by number), land donations to national parks (7.5 per cent), conservation communities (25 per cent), eco-real estate and ecotourism projects (22 per cent), and private administration of government conservation lands (7.5 per cent).

Laird and ten Kate (Chapter 9) examine prospects for pharmaceutical biodiversity prospecting, pointing out, cynically, that this is a poorly understood area except for the recognition that 'many drugs have natural origins, and many sell very well'. They conclude however, that bioprospecting has the potential to provide considerable funding and non-monetary support for forest conservation.

In Chapter 10, May, Neto, Denardin and Loureiro review the ecological value-adding tax adopted by most states in Brazil, as a method of rewarding local governments for protection of forests and unique biological resources.

Chapters 11–14 focus on carbon sequestration credits. Bull, Harkin and Wong (Chapter 11) discuss progress towards creating a market for carbon sequestration credits in British Columbia, noting the substantial effort required on the technical, legal and commercial fronts. Tipper (Chapter 12) examines efforts to involve small farmers in southern Mexico in carbon trading. In Chapter 13, Brand reviews trading in environmental services for Australian forests, with particular emphasis on the Hancock Natural Resource Group (HNRG) New Forests Program. This aims to make a portfolio of reforestation projects available to corporations in the energy, minerals, transport, construction and manufacturing sectors, for cost-effective carbon sequestration. Cottle and Crosthwaite-Eyre (Chapter 14) note that while there are well-developed markets for conventional forestry insurance, insurance of long-term carbon offsets is a more difficult problem. They discuss risk transfer by insurance, noting that forestry carbon projects are subject to political, institutional, trading and project (wildfire and windstorm) risk, presenting a Bolivian case study.

A number of general observations may be drawn from the examples of trading systems reviewed. It is recognised that trading in forest ecosystem services is still in its infancy, and that major administrative issues still have to be overcome. As noted by Brand (p. 244), 'One of the key impediments to commercialisation of environmental services is the lack of definition, accreditation and registration of these goods and services. Clear evidence of demand is necessary to set up markets, which should be recognised as demand driven rather than supply driven'. Transaction costs can be high, including setup, assessment, validation and monitoring costs. The revenue from trading may be sufficient to make a difference in terms of plantation viability. For example, Brand reports that financial modelling by HNRG indicates an increase in the after-tax rate of return on forestry investments from 10.6 to 12 per cent from inclusion of carbon credits, based on a conservative price of $US5 per tonne of CO_2 equivalent. Managing forests for joint products can lead to differences in silviculture, that is, it might be necessary to extend the harvest age and make other adjustments, at some sacrifice to wood production.

The conclusion is drawn that future prospects for trading in ecosystem service credits are bright, particularly for trading in carbon credits. Brand (p. 244) notes the 'widespread optimism that carbon sequestration may be the first of these international environmental commodities. … Once these markets are functioning and the price signals and forward price curves are established, we will see institutional capital take a lead role in providing services such as carbon sequestration, watershed management, and biodiversity enhancement.'

To be the devil's advocate, one could question whether the social efficiency and distributional impact of tradable credits systems for forest ecosystem

services will differ greatly from those of planting subsidies and grants. Transactions costs could indeed be high, and if large companies such as electricity generators and fuel suppliers purchase carbon credits, the cost will be borne by their customers and shareholders (for which there is a large overlap with taxpayers in general). There might, of course, be a stronger psychological driver for environment-friendly activities if these activities are seen to earn their just rewards rather than be supported by a government dole-out.

This book is a must for anyone with a close interest in development of markets for ecosystem services, particularly in relation to tropical forests and watersheds. It also provides a wealth of information about natural resource economics and management. The writing style is clear, and the papers have excellent bibliographies.

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A Disequilibrium Macroeconometric Model for the Indian Economy, by Kaliappa Kalirajan and Shashanka Bhide. Published by Ashgate Publishing Limited, Aldershot, UK, 2003, 215 pages, ISBN 0 75463 479 1, $A79.95 (hdbk).

The book strikes a good balance in its contribution on both theoretical and empirical grounds, thereby appealing to econometricians and modellers, as well as applied economists and policy makers who may or may not be working on India. Let me first elaborate on the theoretical aspects covered in the book, starting with the disequilibrium framework.

Disequilibrium is often taken to be a state that is not optimum. The authors argue that this concept, embedded in partial adjustment models, is problematic. In their treatment, these models are imperfectly specified because optimum values are first derived without the consideration of adjustments, but are later superimposed using the partial adjustment specification. Therefore, they define disequlibrium as a state where a firm is not able to or willing to follow the best practice techniques of a given technology and is, therefore, unable to achieve the maximum possible or potential output from a chosen set of inputs. This may be a result of certain non-price or organisational factors that do not influence the output directly.

The approach to modelling production under this disequilibrium framework is then set out, clearly drawing attention to the more general case of the non-neutral shifting production function, which incorporates observation-specific production behaviour in the varying coefficients model. The authors give new meaning to the concepts of embodied and disembodied efficiency. Also, the taxonomy of technical efficiency is further extended to include

overall efficiency, general efficiency, and input-level invariant efficiency as well as the input-mix effect on firm's efficiency. These ideas are refreshing and well formulated in Chapter 2.

The second theoretical contribution of the book lies in the construction of the macroeconometric model where the results of macroeconomic variables at the aggregate or national level emanating from policy simulations not only provide a full picture of the economy but also allow for model predictions at the state level. In estimating the various equations that characterise the model, the authors have been quite thorough in maintaining robustness and have justified the choice of various estimation techniques used, such as sequential versus simultaneous method in input demand specifications, generalised least squares, instrumental variables and fixed effects approach. These techniques were illustrated by drawing upon specific features in the agricultural sector that they were examining. The macro econometric model was solved using 'within sample' simulations in the period of 1975/76–1990/91.

On the empirical front, the study is enriching in two ways. The first is the computation of the refined efficiency measures in the agricultural sector for 15 Indian states. The second is the attempt to provide richer outputs in assessing the impact of economic reforms at the state level. These impacts were assessed in terms of fertiliser use, tractor purchase and stock, general efficiency, crop yield, and crop output, some of which were estimated as input demand functions, which is yet another contribution of the study. Such analysis incorporating a regional dimension is important, as across India the states are differentiated by the extent of adoption of modern inputs of high yielding seed, fertiliser and machinery, agro-climatic conditions, access to irrigation and markets, and the level of economic development. Therefore, a more accurate picture is seen to evolve for policy prescriptions in contrast to past modelling efforts and simulation exercises, which did not explicitly consider regional variations in production behaviour, thereby masking the impacts at the state level.

A noteworthy point on the simulation analysis is that it not only considers specific measures to raise agricultural output but also macroeconomic policies that may have an impact on agricultural output. Some of the interesting results are as follows:

- Higher agricultural output may not have a positive impact on the output of nonagricultural products as it may be accompanied by higher price levels
- For any supply side stimulus in the form of technology improvements or expansion of irrigation in the agricultural sector to be sustained, an expanding market is essential
- The impacts of various policies on crop output composition has crucial implications for food security

On a more general note, it is best not to try and read this book at one sitting as it can be heavy going in terms of the presentation of empirical results in Chapters 3 and 4, although things fall into place in Chapter 5 where the various sectoral details are integrated in the macroeconomic framework. It would have helped if the diagrammatic presentation on the overview of the model structure in Chapter 5 was set out earlier in the book. It may have been better if some parts of the estimations could have been relegated to the appendix. For instance, the section on the estimation of price equations for various crops seems somewhat dry as it does not add to the discussion in a qualitative way. Overall though, this book is extremely interesting and thought provoking in the way the authors model and discuss the empirical results based on various economic issues.

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Multiple Criteria Analysis for Agricultural Decisions, by Carlos Romero and Tahir Rehman. Published by Elsevier, Amsterdam, 2003 (2nd edition), pp. xiv + 186, ISBN 0 44450 343 9 (hdbk), $US79.

In general this book is a good introduction to solving agricultural decision problems involving multiple objectives and continuous (as opposed to discrete) outcomes or options. There were a number of points raised in the book that I particularly liked which I will cover in detail here. There were also a number of disappointing aspects, largely involving the fact that this second edition of a book first published in 1989 has seen very little revision to make it relevant to the whole field of decision analysis in 2003.

Overall, the basics of the decision-making task are well explained. The reader does not need a very advanced level of mathematical knowledge for them to gain a good understanding of Multi-objective Decision-Making techniques. As well, the explanation of goals, objectives, and constraints is very clear and makes good background reading for any practitioner of the broad area of Multi-criteria Decision-Making (MCDM) techniques.

A number of different Linear Programming, Goal Programming and Multi-objective Decision-Making techniques are explained in detail. At the end of each chapter a critical assessment of each technique is provided, leading the reader to understand correctly the advantages and limitations of each.

The authors place an emphasis on sensitivity analysis which is often overlooked in many MCDM applications. A sensitivity analysis can help in understanding the complexities of the decision problem and how different

trade-offs can influence the final outcomes. This may allow identification of those elements of the problem that may require deeper consideration and analysis. This is essential to the basic premise that the use of these techniques is to enhance understanding of complex decision problems and that the techniques should be used essentially as an aid in the decision-making process rather than solely to produce a single solution. This is often particularly overlooked in the techniques involving continuous problems. These seek to optimise over decision space and may be viewed as methods for producing an optimum answer rather than as means to understanding how that optimum answer may have been derived.

Related to this point is the fact that the authors also emphasis interaction between the analyst running the program and the decision maker (DM) and explain several iterative processes that allow the decision maker to become involved in the solution of the problem utilising their own priorities and preferences. After all, what is the point of such techniques if they are not able to effectively incorporate the views, preferences and understanding of the relevant decision maker?

My satisfaction in the depiction of the iterative approaches and this particular emphasis on interaction with decision makers was overshadowed though by some statements that in many ways seemed to revert to the generally older, and less participatory methods of decision analysis. For example, on page 97 the authors write:

> the main problem or weakness, however, is perhaps in the rather intensive interaction with the DM, requiring information from him at each decision phase, not only on the objective with a satisfactory achievement level, but also on the precise amount by which it could degrade in order to affect improvements(s) in the other attributes. Many decision makers may not be in a position to provide that information consistently; therefore, the accuracy of the solution depends mainly on the capacity of the DM to answer such difficult questions correctly and consistently.

The statement leaves the reader thinking that perhaps it is a bad idea to extensively involve decision makers in the process and this, I believe, is the wrong message for proponents of decision analysis to be advocating. The responsibility should lie with the developers of such techniques to make them accessible for use by ordinary lay people who may indeed be the relevant decision makers. In other words, the authors could have made the point that it is the techniques that require changing in order to facilitate interaction with decision makers rather than just leaving the decision makers out of the process altogether.

Similarly, the authors go on to say that 'too large a number of questions increases the likelihood of inconsistent answers' (p. 99). I would like to have seen the latter statement backed up by reference to some reputable analyses.

Perhaps this regression to the older less participatory style of decision analysis though is related to the fact that the book was originally published in 1989 and appears to have few revisions incorporated for this edition published in 2003. It becomes very obvious that this is the case when references are cited. Out of the total 231 references cited, only 25 belong to the period since 1990. Although the work itself is based on sound knowledge developed in the early days of MCDM that still holds true today, it does have implications for some of the issues raised in the book such as references to suitable software programs and also the amount of time required to run some of these programs. For instance, the authors refer to 'state of the art reviews of MOP' (Multi Objective Programming) which only includes studies carried out between 1971 and 1986 and, therefore, are hardly 'state-of-the-art' in 2003. Also, there are references to programs using Fortran code with 'large' computational requirements such as '125 computer runs' and the reader is left wondering if this is a recent addition to the book or one of the original pieces of information written prior to 1989.

Another point of contention is the fact that the authors make reference to the acronym MCDM throughout the book but the title refers to Multiple Criteria Analysis (with this being the only reference to MCA). I regard these as two different fields of decision analysis where Multi-criteria Decision Making refers to the whole range of both continuous and discrete methods and Multiple Criteria Analysis refers to only a subset of discrete approaches. Therefore, as the book focuses on continuous approaches only (MCDM), the title (MCA) may be misleading for some readers. A greater explanation and typology of different techniques could have been included to help the reader understand these differences.

Finally, there are several typographical errors in the equations that may make it difficult for a first year student to understand some of the basic concepts explained. For example, the omission of I (the Ideal Point) in the diagram in Figure 4.4 on page 57 is a fairly critical one.

Overall though the book would provide the foundation for a good basic understanding of this type of decision analysis and could be used by students of introductory courses at university. It would form a wonderful historical perspective though if the 3rd edition were to thoroughly update this edition and build on all the excellent pieces of work that started in the 1960s, 1970s and 1980s (many of which are cited here) and add to these some of the more recent and extensive additions to the published literature. As such, it would provide a starting point for the reader to move into the more

complex, fuzzy and real-world applications of the MCDM techniques involving many different types of people who need help in understanding their complex decision problems.

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New Dimensions in Ecological Economics: Integrated Approaches to People and Nature, edited by Stephen Dovers, David I. Stern and Mike Young. Published by Edward Elgar Publishing, Cheltenham, UK, 2003, pp. xi 215, ISBN 1 84376 079 7 (hdbk), $A115.

This book is primarily based on papers presented at the Special Symposia on Integrative Approaches, which was held within the 2000 International Society for Ecological Economics biennial conference, Canberra. Apart from the introductory chapter by the editors, it is a collection of 11 papers involving 15 authors.

The editors do not reveal their criteria for selecting papers, yet state their intention is 'to inform an extended discussion of what ecological economics is, and what it could be … If it [the book] does spark discussion and even unsettle views of ecological economics, … then it will have performed a useful role' (p. 27). Therefore, the papers presented provide varying perspectives of what could be ecological economics, sometimes with contradicting recommendations – though always keeping sustainability and integrative work as central themes.

The editors open the book with a definition of ecological economics and discussions about its strength in providing an interdisciplinary field for studies in sustainability. The introductory chapter includes an overview of the structure of the book, in three dimensions: Big Challenges; Reorientations and Openings; and Frameworks and Applications, as well as a brief review of all chapters.

The first dimension presents a number of big challenges to the discipline by clarifying that ecological economics offers more than just ecology and economics. It combines a cautionary tale of the limitations of economics in understanding people and 'big issues' (Proops, Chapter 2) with the value-added capacity of other disciplines exploring integrated research (Norgaard, Chapter 3). Both chapters identify new areas where future work should be undertaken, ranging from teleological issues to enhanced discussions with other disciplinarians. This dimension is rounded out by a very personal discussion on how to do integrative research (van Kerkhoff, Chapter 4).

This first dimension is useful in that it frames ecological economics as a problem focused discipline, requiring strength in inter and intradisciplinary dialogue to provide answers. The three chapters in the first dimension identify opportunities for future work, with new pathways being outlined. The second dimension of the book adds to these paths. Chapters 5–7 contain reviews of other disciplines and provide a critique of ecological economics and its need to blend more with other integrative disciplines; namely geography, psychology and behavioural economics (respectively, Barnett *et al.*, Knetsch and Lea). Each chapter revolves around a different argument for integration. For example geography, as the original integration discipline, is stated to be the best avenue for sustainability research (Chapter 5), whilst psychology and behavioural economics are identified as absolutely integral to economics in providing a realistic appreciation of peoples' behaviour, whether rational or irrational (Chapter 6 and 7).

The final chapter in this section by Dovers (Chapter 8) discusses the complex policy process and the varying disciplines that add to the debate and analysis of policy issues such as sustainability. Dovers draws heavily on Australian research and provides a broader structure to the role and potential power of ecological economics. For example: 'A policy orientation, it is argued, provides one entry into problem framing for integrative approaches to sustainability' (p. 167).

The first two dimensions of the book, though divided into Big Challenges, and Reorientations and Openings seem to flow smoothly between the dimensions, perhaps indicating the divide is less pronounced between problems and opportunities than first impressions might suggest. The editors' introductory paragraphs about where the discipline has come from are a useful anchor to newer readers of the discipline for these two sections of the book. Chapter 8, on policy, is used to drift into the final dimension: though it sits rather awkwardly between opportunities and applications. The chapter neither forms a bridge to close the gap between 'big ideas' and 'real world application', nor provides the depth of theoretical backing that many of the earlier chapters in the first two sections exhibited. Potentially Chapter 4 on the practical application of integration research could have bridged the gap easier.

The final dimension, Frameworks and Applications, provides examples of how integrative research can be applied. Van der Heide *et al*. (Chapter 9) outline a number of methods for decision-making, such as cost-benefit analysis, safe minimum standards, and spatial modelling. The authors also state that economics has focused on the application of these tools with respect to environmental policy (i.e., pollution) but there is a need to expand their application to nature policy (i.e., sustainability), for example investigate 'bads' and 'goods'. Stern (Chapter 10) provides an empirical

stochastic model investigating technological change, economic production and the environment, showing that change in the quality of the environment and resources is the same as change in technologies created by people.

The authors of the final two chapters adopt a systems approach, specifically investigating the benefits of stocks and flows to social-ecological investigations. Wasson (Chapter 11) provides a lucid discussion of the prevalence and importance of the stocks and flows concept across many varying disciplines (medicine to accounting). Specifically, Wasson suggested that understanding systems (e.g., local catchments) in a 'mass balance' manner provides for better decision making potential. Courville (Chapter 12) wraps up the book with a focus on the value of documenting social and ecological flows along with economic and monetary flows. Her topic, international trade, raises spatial and temporal issues associated with integrative (systems) modelling.

Ecological economics has three future options: (i) tinker at the edges of economics/ecology; (ii) apply theory, methods and ideas from various disciplines to the sustainability problem; and (iii) transcend economics, ecology and other disciplines to provide a new 'discipline'. The final four chapters fit into each of these categories. The author of Chapter 10 tinkers around the edge of economics, the authors of Chapter 9 apply established methods and techniques to sustainability problems and the authors of Chapters 11 and 12 endeavour to transcend current economic and ecological disciplines. These efforts demonstrate that the discipline is currently broad enough to undertake any new direction.

Time and space limitations do not permit a comprehensive review of all the good things in the book. For example, there is continued reiteration of the value of working across and within disciplines. 'The "real" world, made up of structures, systems and actors that we study, is not compartmentalised by disciplines' (p. 196). A variety of spatial scales of problems are provided as examples, from local catchments to international trade. While many of the case studies in the book are Australian ones, there are some developing country examples (Botswana and Mexico).

On the negative side, the varying writing tones throughout are distracting, and there is an obvious omission of market instruments and their impact. The continual reference by authors to previously discussed issues, with no recognition of conclusions of the earlier authors is a little underwhelming. Because of the significant overlap of ideas, issues and themes each section would have benefited by a summary or a final review to pull out common themes and map the overlapping opportunities presented by the book as a whole.

Overall, the book is a worthy addition to the libraries of researchers interested in integration or for people who are exploring the application

of economic theory to real world situations. The strength of the book is the focus on the important role of integrative research in addressing the 'wicked' problems (e.g., sustainability) at both policy and research levels. The book could more aptly have been titled 'Opportunities in Ecological Economics: The Importance of Integration'. In conclusion, this book, coupled with Costanza and King's (1999) 'The first decade of ecological economics' would provide all interested people with a good understanding of what ecological economics can offer the world of complex 'wicked' problems.

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Reference

Costanza, R. and King, J. 1999, 'The first decade of ecological economics', *Ecological Economics*, vol. 28, pp. 1–9.