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Book Reviews

Environmental Policy Analysis for Decision Making, by John Loomis and Gloria Helfand. Published by Kluwer Academic Press, Dordrecht, the Netherlands, pp. xiv + 329, ISBN 0 79236 500 3 (hdbk), $US143.00.

Courses in the field of natural resource and environmental economics are now taught to a large and diverse audience of undergraduate and postgraduate students, from economics majors through to students in environmental science and engineering. In addition, the methods of environmental economics, non-market valuation, market-based instruments and risk analysis are being applied more widely to assist in resolving policy choices. Among policy makers therefore there is an increased need to understand the techniques of economic policy analysis – perhaps particularly the methods of non-market valuation and benefit-cost analysis – and also their limitations.

This textbook emerged from a course taught by Helfand at the University of Michigan. Although the authors do not state this explicitly, it is written primarily for students who are not economics majors. For instance, it would serve the needs of an environmental science student who wants a broad survey of practical economic analysis, but does not want to be troubled with too many details about the underlying economic or econometric theory. Chapters 1–4 discuss a pragmatic approach to delivering a policy analysis as an economic consultant. These chapters include insightful sections on ethical concerns in policy analysis (Chapter 1), the trade-off between cost and accuracy in research (Chapter 2), and developing a relationship with a client (Chapter 4). Chapter 5 reviews different modelling approaches including regression models, linear programming and calibration, while Chapter 6 gives a succinct introduction to regression analysis with examples drawn from environmental economics.

Chapters 7–9 are probably the strongest chapters in the book. They cover benefit-cost analysis, discounting and non-market valuation at a level that would suit an undergraduate student with an elementary grasp of statistics and economics. At the same time, however, they usefully set out some of the problems and issues, including trade-offs between equity and efficiency and the use of conjoint analysis in choice modelling, which would encourage a more advanced student to read further. The remaining chapters 11–14 cover regional input-output models, optimisation methods including linear programming, risk analysis, and case studies of constructing environmental

impact statements, performing benefit-cost analysis and addressing non-point source pollution.

As a textbook, this volume is something of a puzzle as it is not clear who its intended audience is. It would be hard to imagine teaching linear programming or regression analysis from the short chapters contained here. For each of these topics, moreover, there are other texts which cover the topics in greater depth but with the same level of assumed prior knowledge. The strength of the text lies in its accessibility to noneconomists and its portrayal of economics as a set of practical tools for policy analysis. Hence, I envisage the book being of particular value for courses taught to reluctant noneconomists stuck with taking a compulsory unit in environmental economics. It would also be a useful reference to policy makers who commission economic research and need an accessible account of the research methods available.

Given a price of $US143 ($A220), the authors' ' ... dream ... that everyone who conducts or uses environmental policy analysis will have a well-thumbed copy of this book at hand at all times' is likely to remain unfulfilled. This is unfortunate, as this text is full of useful and pragmatic insights into environmental policy analysis, which would benefit most applied environmental economists and may even help convince some sceptical noneconomists that economics has a role to play in this domain.

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Applied Environmental Economics: A GIS Approach to Cost-Benefit Analysis, by Ian J. Bateman, Andrew A. Lovett and Julii S. Brainard. Published by Cambridge University Press, Cambridge, UK, 2003, pp. xxi + 335, ISBN 0 52180 956 8 (hdbk), $US65.00.

The use of Geographic Information Systems (GIS) is well established in the natural resource management field, providing a powerful tool that can integrate and overlay a range of spatial and temporal data from a range of sources, undertake a wide range of analytical operations, and produce results in mapped, graphed or tabular form. Application to economic analysis is less common, but the flexibility and benefits of GIS are beginning to become more apparent to environmental economics practitioners.

This book seeks to demonstrate a number of ways that GIS can be employed to enhance environmental economic analysis (in this case cost-benefit analysis (CBA)). It is argued that GIS can considerably improve the way in which real world complexities are incorporated into CBA, as well as

reducing the need for simplifying assumptions. The review and analysis presented in the book is based around a UK study that examines the economic potential for conversion of land from conventional agriculture to multipurpose woodland in Wales, and aims to undertake a CBA that incorporates a full range of economic values.

The book is arranged into 10 chapters. Chapter 1 explores the nature of values used in economic analysis, and how ethical considerations may influence the nature of the analysis in terms of the incorporation of non-use values. Having undertaken an exploration of ethics and sustainability, the authors choose to undertake a study that is neoclassically utilitarian in its ethical basis. A brief introduction to GIS is also given, which highlights how previous limitations in terms of data handling and modelling may be overcome by the use of this tool.

Chapter 2 reviews the estimation of recreation benefits using the non-market valuation techniques of contingent valuation (CV) and the travel cost (TC) method. For readers who are unfamiliar with these techniques, the authors provide a useful critique of each method, and highlight where their application is most appropriate. Other non-market valuation techniques such as hedonic pricing and choice modelling are mentioned briefly but not reviewed. A range of previous applications of CV and TC to determine woodland recreation values in the UK is then reviewed in Chapter 3, identifying a number of problems with these studies in terms of methodology, data analysis and reporting. In their own applications of these valuation techniques in the same chapter (which use GIS mapping capabilities to standardise and improve the derivation of key variables such as travel distance and duration), the authors are unable to overcome some of their concerns regarding prior applications, with large variations in their valuation estimates for both the CV and TC approaches. In the final chapter, related to the recreational value of woodlands (Chapter 4), GIS is used to manipulate travel cost data and generate a transferable arrivals function to predict the number of visitors to a particular woodland site, as well as extrapolate to other sites. Findings from the previous chapter are applied to obtain valuations of potential demand.

The next three chapters are related to tree growth and its related benefits. For those unfamiliar with the history of the commercial timber industry in the UK, Chapter 5 provides a useful overview of the industry in order to assess the current social and private value of timber production. The costs and revenues are then determined for a single softwood and a single hardwood species, which necessitated a review of the appropriate discount rates for the various decision-makers considered as part of the overall study. Chapter 6 highlights the strengths of GIS as a tool to determine robust timber yield estimates, both in terms of the sample size it can consider and

its ability to incorporate a variety of biophysical information and display the results spatially. This is achieved by using the UK Forestry Commission's subcompartment database overlain with the environmental characteristics of a particular site (1-km^2 grid cell) such as soil type, temperature and rainfall. On the basis of the yield estimates, an analysis of carbon sequestration (net carbon storage in live wood, products, waste and soil) is undertaken in Chapter 7 to quantify the impact upon carbon storage of afforesting agricultural land for the two chosen species.

The final aspect to be considered in Chapter 8 as part of the overall CBA is the agricultural component. Following a review of UK agricultural policy, the market and shadow values of sheep and dairying enterprises are estimated. Despite a reluctance for diversification, it would appear that current poor farm-level profitability is conducive to changes in land use being considered. This is confirmed in Chapter 9, which assesses the net benefits of converting land from agriculture into woodland by undertaking a CBA. The values determined in previous chapters relating to recreation, timber values, carbon sequestration and agriculture are overlaid using GIS value maps to come up with net values. These maps illustrate that there is large spatial variation in net present values (NPV), which would not have been evident if a global NPV had been produced for the entire study area in the absence of GIS technology. The final chapter summarises the research findings, identifies some of the limitations of the analysis, and highlights the omission of certain values (such as biodiversity and habitat values of woodlands) from the overall CBA.

In summary, given the title of the book, readers with expectations of substantial progress and innovation in the application of GIS to applied economic analysis might be disappointed. However, for those with no knowledge of the applications of GIS in an economic context, the book provides some insight into some of the capabilities of this tool. The overall application of a full CBA in this study is very sound and provides some interesting results that are also useful for the Australian context when considering land use change options at a regional scale.

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Pollution and Property. Comparing Ownership Institutions for Environmental Protection, by Daniel H. Cole. Published by Cambridge University Press, Cambridge, UK, 2002, pp. xvi + 209, ISBN 0 52100 109 9 (pbk), $A49.95.

This book by Daniel Cole, Professor of Law at Indiana University School of Law, comes at a propitious time for those with an interest in natural

resource management policy in Australia. The term property rights has had a prominent place in policy debate in the last few years, particularly with respect to the allocation of water resources among irrigators and environmental uses. This emphasis has probably been seen as a welcome shift in the framing of policy issues by some (the proponents of market-based solutions to water allocation), while others (legal scholars, political scientists and sociologists) have looked on with a growing sense of unease as political momentum has built behind over-simplified concepts of property rights in natural resources.

Illustrated with case studies from around the world, Cole's book is a timely reminder of the inherent complexities and tensions that face the policy analyst who would propose property rights-based solutions to natural resource problems.

Cole commences in chapter 1 by outlining the conceptual framework which underpins his subsequent analysis of the relationships between pollution and property. He argues that it is not sufficient to suggest that environmental problems have their origins in an absence of property rights in natural resources. This neglects the question of why it is difficult to establish these rights, which in turn neglects the question of how economic, institutional, technological and ecological circumstances affect the costs of defining property rights and transacting in environmental goods. After a brief review of the antecedent published economic literature, with detours to dispose of a popular misnomer (the tragedy of the commons that should be termed a tragedy of open-access) and a false dichotomy (command-and-control versus property-based policy instruments), Coles poses the question which he aims to answer in the book – ' ... the choice in environmental protection is not *whether* to adopt a property-based approach, but *which* property-based approach(es) to adopt' (p. 17).

In the ensuing chapters, Cole describes the utility and limitations of: the public property/regulatory approach, mixed private and public property/regulatory approaches, the private property/non-regulatory approach, and common property/regulatory systems. He concludes that each approach has its advantages and disadvantages and that no single property regime can be held to be preferable across all economic, institutional, technological and ecological contexts.

In chapter 7, Cole then turns to the task of how the policy analyst might make a choice between these approaches. He sets the very modest goal for himself of an '… informal model that is, of necessity, rudimentary' (p. 130). Cole argues that the preferred property regime should be that which achieves, for a given set of environmental and technological circumstances, the most environmental protection for the least coordination and exclusion costs, rather than being determined by supposedly inherent characteristics of the resource itself.

From this point, however, the book seems to lose its momentum. The promise of elaborated principles for property regime choice does not eventuate after a lengthy account of the history of the ownership of Stonehenge. Nevertheless, this account makes fascinating reading – I wonder how many know that Stonehenge could have ended up in a USA theme park had the owner of the land on which it stands stood by his threat when the UK government did not meet his price?

The final sizeable chapter before the two-page epilogue takes the book off in another direction – an examination of takings law in the USA. While this might seem to be of little relevance to Australia, there actually appear to be some salutary lessons for Australian resource management policy. Cole shows that the concepts of property and takings have served the USA judiciary poorly, leading them to considerable difficulties in making consistent and principled judgements about resource conflicts where public and private interests collide. In many cases, it appears that the difficulties in deciding who had property in what, and what actions by governments constitute a taking, could be easily have been avoided by simple regulations that specify how costs are shared among those whose interests are affected. The experience with USA takings law suggests that the enshrinement of natural resource access in property is an action which should not be taken hastily. Unfortunately, with water resource access in Australia, the opposite seems to be the case.

Despite its meandering latter part, there is much in this book for the Australian reader. It will provide considerable pause for thought for the policy analyst who believes that most of Australia's natural resource problems can be solved by creating property in resource access. For the legal scholars, political scientists and sociologists, the book will raise awareness of the critical importance of the costs of coordination, exclusion and monitoring in resource policy choice. The latter readership group will be pleasantly surprised to find that, in this predominantly economic text, Cole actually acknowledges that culture and ideology are important explanatory factors in understanding the history of policy choices about property regimes.

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Policy Instruments for Environmental and Natural Resource Management, by Thomas Sterner. Published by RFF Press, Washington, DC, 2002, pp. xxii + 504, ISBN 1 89185 312 0 (pbk), $US36.95.

Policy instruments for environmental and natural resource management have proliferated in recent years to the point that it is difficult to provide a

comprehensive survey of the field. Sterner's book does not purport to be an encyclopedia of problems or policies. Nevertheless, it presents an extensive range of diverse examples of instruments and their practical application to many types of problems. Experiences in the United States, the Organisation for Economic Cooperation and Development, and many other countries are examined, including some countries with formerly planned economies. Although clearly focused on economics, the book draws on political, legal, ecological, social and psychological research.

The book is divided into seven parts. Part 1 provides background on causes of environmental degradation and discusses public goods, congestion, asymmetric information and uncertainty. Issues in adapting economic models to ecosystems (such as intertemporal, spatial and ecological complexities) are considered. The evolution of rights is presented, with some discussion of water law and common property resources. This material is similar to that found in other environmental and resource economics textbooks, but well peppered with practical insights.

Part 2 illustrates a range of available policy instruments including tradable permits; taxes; subsidies, deposit-refund schemes; refunded emissions payments; and property rights, legal instruments and informational policies. Issues associated with national policy and planning (such as institutional arrangements and historical context) are raised.

Part 3 addresses a selection of policy instruments. Efficiency; the role of uncertainty and information asymmetry; equilibrium effects and market conditions; distribution of costs; politics and the psychology of policy instruments; international aspects and instrument design are all considered. This part of the book is summarised in a Policy Selection Matrix, which is likely to be of especial interest to analysts advising policy makers. This suggests which policies are likely to be preferred given various selection criteria (such as efficiency and cost effectiveness) and conditions (such as uncertainty, complexity, and type of market structure) that characterise a particular problem. In the real world, problems are generally complex – multiple imperfections are likely to be present and interaction between conditions can be significant, for example – so, although the matrix is a useful tool, it is no substitute for detailed analysis of specific issues in particular settings. As Sterner notes, it would be impossible to account for all of the complexities in only one table.

Parts 4–6 illustrate the theoretical concepts by considering instrument choice and design for road transportation, industrial pollution (covering experience in both developed and developing countries) and for management of ecosystems and natural resources. The latter includes chapters on water, waste, fisheries, agriculture and forestry. Coverage in the applications sections varies considerably in depth from one issue to the next. The

chapter on water, for example, focuses mainly on urban water and international development. Issues associated with irrigation water in developed economies such as Australia are not addressed. No connections are made between water use, land management and externalities such as salinity (although managing agricultural runoff is briefly raised in the agricultural chapter). Linkages between groundwater and surface water are also not mentioned. Similarly, the chapter on ecosystems focuses on management of protected areas but does not consider policies addressing biodiversity on land managed primarily for purposes other than conservation. By contrast, policies to eliminate lead from fuel are given relatively longer treatment.

The final part of the book summarises policy issues and potential solutions. The conclusion is optimistic, suggesting that, although future environmental and resource problems are significant, they are probably not insurmountable. A call is made for collaboration between countries, across disciplines and between different segments of society.

The breadth of the book is both its blessing and its curse. Many parts will leave the reader wanting more. The discussion on property rights, for example, observes that the more rights are divided, the more boundaries exist between them and the greater likelihood of generating new externalities – but little more is said on this important topic. Justice to all issues could not possibly be given within the one volume. In his preface, Sterner acknowledges that many significant issues are not covered at all, or not in proportion to their importance. However, important aspects not selected for coverage in the allocated space are not always acknowledged in the chapters, and, at times, more direction could have been given to interested readers who want to pursue a subject in more detail.

In his preface, Sterner suggests that the book is intended for academics, undergraduate and graduate students and analysts advising policy makers. A number of sections of the book are directed at people in countries who have not yet made extensive use of market-based policy instruments. The book is relatively non-technical in the sense that most mathematics is relegated to boxes and concepts are illustrated with diagrams. Suggestions for supplemental reading on some subjects, and links to useful websites are helpful. This book will be useful for analysts advising policymakers, but the style of presentation does not lend itself to quick assimilation of information. It is more likely to be suitable as a text for graduate rather than undergraduate students given the density of ideas presented and the relative brevity of coverage of basic concepts.

Prospective readers might be interested in reading a good summary (24 pages) of the book published by the Swedish International Development Cooperation Agency titled Instruments for Environmental Policy. A copy can be downloaded at http://www.sida.se/content/1/c6/01/76/86/Instruments

ForEnvironmentalPolicy.pdf. This would be useful supplemental reading for an undergraduate or graduate class.

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Health, Nutrition and Food Demand, edited by W.S. Chern and K. Rickertsen. Published by CABI Publishing, Wallingford, UK, 2003, pp. xii + 290, ISBN 0 85199 647 7 (hdbk), £55.00.

Nutrition problems did not disappear with the green revolution of the 1970s and 1980s. In developing countries under-nutrition among the low income sectors is still an important issue (UNDP 2003) while there has been increasing concern about over-nutrition in developed countries (Mokdad *et al*. 1999). Over-nutrition manifests itself in obesity and ultimately in related non-communicable diseases such as diabetes, some cancers and coronary heart disease. Caswell (1998) has reviewed the published literature on how one might value the benefits of improved nutrition. In an Australian context it has been estimated that around 60 per cent of the adult population are overweight or obese (Cameron *et al*. 2003) and that the annual cost to the Australian community of this over-nutrition is probably over $A1 billion (Department of Health and Ageing 2003). Recently attention has been focused also on over-nutrition in the Pacific Island nations close to Australia, particularly Nauru, American Somoa, Western Somoa, Tonga and Fiji (Secretariat of the Pacific Community 2002). In these countries the problems of under-nutrition and over-nutrition exist side by side and are potentially critical in terms of their impact on economic and social progress. *Health, Nutrition and Food Demand* contributes to an understanding of the formulation and analysis of policy in this important area by reviewing the evidence on how, and to what extent, information on the health implications of particular foods and diets influences consumers' dietary choices.

Chern and Rickertsen have edited a collection of 13 papers presented at the conference 'Effects of Health Information on the Demand for Food: EU and US Experiences' held in Berlin in 2000. As the title of the conference suggests, the papers focus on the developed country perspective (specifically European and USA) but many of the issues and conclusions that are discussed will be of interest to those involved with nutrition policy in developing countries. The papers have a common approach in that they are all applied with an emphasis on the empirical measurement of the relationship between food demand and consumer information.

The common thread to the health promotion policies analysed in the papers in this collection is the premise that individual consumers choose unhealthy diets because they have poor information concerning both the nutritional nature of the food available and the implications of the various foods for personal health. As a consequence individual food choice, on both the nature and quantity of food consumed, results in unintended and unanticipated private and public costs. The private costs include heightened health risks, lack of self esteem and reduced mobility, while the public costs are associated with the diversion of scarce public funds to deal with the medical consequences of the dietary choice. The typical policy responses world wide have been education in schools and the general community, coupled with nutrition labelling, dissemination of health information in the media, advertising and the promotion of active life styles.

The news for health professionals from this collection is that empirical evidence about health information presented in the media and professional medical journals does influence food choice by consumers but not overwhelmingly so. On balance, the influence of expert evidence appears to play a greater role in the USA than in Europe. One of the stronger findings to come forward was that apparently objective health information published by health professionals and authorities is more influential in influencing food demand than is food advertising by industry. This has clear implications for agricultural industries planning aggressive advertising campaigns to counter food scares.

The issue of how to measure health information received particular attention in many of the papers and will be of interest to analysts involved in information modelling. Creating indices that meaningfully reflect the timing and extent of the flow of information to consumers is fraught with difficulty and no doubt the problems in this regard may well explain why some studies failed to find support for the notion that health information influenced food demand.

In the light of the mixed evidence on the effectiveness of information policies, Santarossa and Mainland provide an interesting investigation of the potential for using Pigovian taxes to drive private consumption decisions to the socially optimal nutrient mix and level. The concept of a *fat tax* has been promoted earlier by Kristiansen *et al*. (1991) and Marshall (2000) and resulted in much debate in policy circles.

Using Scottish consumption data drawn from UK National Food Survey, Santarossa and Mainland calculate a tax for each food type based on the individual nutrients in each food and the extent to which the levels of those nutrients consumed by the average Scottish householder depart from approved dietary guidelines. The resulting optimal food taxes would result

in increases in food prices of between 0 for alcohol up to 24 per cent for fats and oils. In terms of expenditure shares, the importance of meat, vegetables and fruits would increase (by 0.09 per cent, 0.12 per cent and 0.06 per cent, respectively), while the importance of fish, dairy products, cereals, eggs and fats would decline (by 4.65 per cent, 4.72 per cent, 2.94 per cent, 12.56 per cent and 11.29 per cent, respectively).

The resulting post-tax price regime potentially internalises health externalities and compensates for the consumers' average degree of ignorance about nutrition. While it is difficult to imagine a tax structure as complex as the Santarossa-Mainland proposal being workable or politically attractive, their implicit taxes show the importance of relative price changes in food choice. By implication this also reinforces the importance of getting the whole agricultural food policy mix right. This is especially the case in developing countries where food elasticities could arguably be higher than in the sample used by Santarossa and Mainland.

Lloyd, McCorriston and Morgan provide an interesting analysis of the impact of the bovine spongiform encephalopathy (BSE) crisis on UK beef markets. Not surprisingly the evidence suggests that farmers suffered most, with the financial impact declining as you move along the marketing chain.

Overall this book provides a worthwhile collection of empirical papers on food demand. It is potentially useful for both the health policy community and food demand analysts. There is ample evidence on trends in food demand in a range of countries while many of the papers provide estimated food demand elasticities that will be of general policy interest. The specific focus on health information and food demand is both timely and interesting and provides useful insights into this difficult but important policy area.

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