

## Book reviews

*Green Taxes: Economic Theory and Empirical Evidence from Scandinavia*, edited by R. Bränlund and I. Gren. Published by Edward Elgar, Cheltenham, 1999, pp. xvi +157, ISBN 1-85898-859-4.

This book is mainly based on papers presented at a September 1995 Stockholm workshop organised by the Swedish Commission on Green Taxes and the Beijer Institute of Ecological Economics. Sweden, Denmark and Norway were among the first countries to impose green taxes in the 1980s and, by the early 1990s, revenue from green taxes accounted for more than 10 per cent of government revenue. All countries introduced significant reforms to their overall taxation systems in the early 1990s. In the mid-1990s commissions of inquiry on green taxes were established. The commissions were to report on issues such as the possibility of a ‘double dividend’ (the notion that green taxes could replace more distorting taxes on labour and capital, resulting in an improvement in economic efficiency), the impact on unemployment, the environmental effectiveness of green taxes and the effect of green taxes on international competitiveness.

The chapters in the book reflect the concerns of the commissions of inquiry. Most focus is on taxes on carbon dioxide emissions and there is only limited discussion of other green taxes. The discussion is somewhat dated as there is no mention of commitments made under the Kyoto Protocol of December 1997.

After an introductory summary, there are eight chapters. The first three chapters discuss the history of green taxes in Denmark, Norway and Sweden. The analysis is largely descriptive apart from the chapter on Denmark that reports simulations of a carbon dioxide tax using a computable general equilibrium (CGE) model.

The next two chapters deal with the issue of the double dividend. David Starrett develops a theoretical model while Lawrence Goulder summarises the theoretical issues and presents simulation results from his own model of the US economy. Both authors consider it is unlikely that double dividends will be realised starting from existing tax systems where inputs (capital and labour) are taxed. An explicit green tax on outputs also represents an implicit tax on inputs that can be as distortionary on factor markets as any input tax that it replaces. In addition, a green output tax will create further distortions in intermediate good usage and final consumption. While parameter values exist where the double dividend may be realised, neither author considers such values to be highly plausible.

Chapter 6 by Glenn Harrison and Bengt Kriström is the longest in the volume. It presents simulations of a doubling of the 1995 structure of the carbon tax in Sweden under various assumptions using a CGE model. The 1995 structure of the carbon tax involved the manufacturing sector paying only one-quarter the rate of carbon tax as the rest of the economy. A uniform carbon tax was introduced in 1991 but reduced rates were announced for manufacturing in 1993 due to fears about the impact on the international competitiveness of Swedish manufacturing.

It was found that a doubling of the carbon tax would have only a moderate effect in reducing emissions. For the 87 sectors identified, there were more cases of increased emissions than reduced emissions. This appears to be an unusual result for anyone familiar with the type of results obtained from simulating uniform carbon taxes with CGE models. It might be suspected that the lack of uniformity in the Swedish carbon tax contributed to this result. Unfortunately, a simulation with a uniform carbon tax is not presented to test this hypothesis. Simulations were also run where carbon tax revenue was used to replace revenue from various other taxes and in all cases welfare decreased. Thus, no evidence of a double dividend was found.

Another set of simulations was run to approximate the Swedish policy of phasing out nuclear power generation. In 1995 nuclear power accounted for about 50 per cent of electricity production. The simulations were run by constraining total electricity production rather than attempting to model substitution options in the electricity sector subject to a nuclear constraint. It was found that a nuclear constraint reduced welfare losses relative to relying only on the carbon tax to achieve a given reduction in emissions. Such a result at first sight runs counter to the standard theoretical results on the superiority of market-based over command and control policies. However, the standard results relate to a uniform tax rather than a differentiated tax of the Swedish variety. Again it would have been possible to test the influence of the differentiated tax by running a simulation with a uniform tax. It is also possible that the results might be modified if substitution options in electricity generation were modelled.

In the next chapter, a partial equilibrium analysis of green taxes in Sweden is presented based on econometric analysis. The results for a doubling of the carbon tax tend to support the results of Harrison and Kriström, suggesting a relatively small reduction in emissions. An analysis is also presented of the effect of a tax on nitrogen fertiliser. Demand for fertiliser was found to be relatively inelastic so that relatively large taxes would be required to have a significant impact on use.

In the final chapter, a number of studies of labour supply in Sweden are reviewed as relevant to the double dividend issue. The results support a

positively sloped labour supply curve with female supply more elastic than male supply. There is considerable variance in the estimated elasticities but it is shown that this can be largely explained by differences in sample selection and data sets.

Overall, results from the different chapters suggest caution in assessing the net gains from unilaterally imposing carbon taxes. Double dividends appear unlikely, there is the risk of loss of international competitiveness and the problem of emission leakage (whereby a cut in emissions prompts an increase in emissions in non-abating economies) reduces the environmental effectiveness of unilateral action. Swedish policy has swung from initial enthusiasm when carbon taxes were first imposed in 1991, to creating exemptions for manufacturing industry in 1993 and announcing further Swedish action to curb emissions growth was dependent on coordinated international action.

The book may be of interest to students of the evolution of green economic policy and those with a special interest in the Scandinavian economies. However, it does not contain any new analytical techniques and the theory of double dividends has continued to develop in more recent journal articles.

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*Environmental Economics: Individual Incentives and Public Choices*, by Ian Hodge. Published by Macmillan, London, 1995, pp. xii + 205, ISBN 0-333-57771-X.

This book is intended as an informal treatment of technical environmental economics. It is beautifully written by Ian Hodge and covers a broad range of issues in a short space. The book provides an excellent index and although it does not have a reference list or extensive referencing throughout the chapters it provides 'Notes and Further Reading' at the end of each chapter; here references are given to the general and more specific sources for each chapter's text. The book provides no Australian case studies, although case studies used in Part II of the book are generic or global by nature and so can be applied to Australian issues. Importantly, the book is easy to read and flows well, with Part II, the case studies, applying the basic principles of environmental economics developed in Part I, with links to the Part I chapters explicitly outlined.

The author claims that the book assumes little background in economics. This is essentially true, although concepts such as marginalism and

optimality are used in the description of current practice in environmental economics. A non-economist will struggle with these ideas and their foundation is not adequately explained. Although the book includes no mathematics, it uses diagrams well to explain, among other topics: the impact of externalities on supply and demand equilibrium (p. 35); principles of optimal environmental quality (in a static framework and a dynamic framework) (Chapter 4); optimal taxation (p. 90); and the operation of tradable permits (p. 97).

Throughout the book the author takes the following general position. Sustainability requires some action to be taken. Individuals can take action but their options are limited by the institutions within which they live. These institutions can be altered by social change or policy initiatives that favour the environment. Economists, then, have the role of convincing policy-makers of the problems of the current institutional configuration (for example, inadequate property rights, the subsidising of fossil fuel use), and how to correct them (for example, permits, taxes). Economists do this by understanding incentives and markets and so recognise why environmental problems occur, and by assessing policy options to work out the practical and cost-efficient methods of achieving desired outcomes. Economists also assist in convincing policy-makers of the need for change by valuing the environment. This allows a direct comparison of costs and benefits that, the author indicates, must be adjusted when making decisions due to irreversibility and uncertainty in environmental problems. That is, sustainability suggests putting extra value on environmental improvement.

Following this focus, the book proceeds as follows. Chapter 1 is an introduction and, together with Chapter 2, sets out the basis of the environmental problem. In Chapter 1 the economic system is seen as existing within the broader environment using inputs that lead to consumption and the distribution of waste. Kenneth Boulding's 'spaceship earth' is discussed and overall there is an ecological economics feel to the first chapter. Chapter 2, 'Economic Growth and the Environment', discusses growth and the environment, covering history of thought developments with a discussion and brief critique of Malthusian limits and the Club of Rome's 'Limits to growth'.

Chapter 3, 'The Elements of Environmental Problems', sets up the tools needed to analyse environmental problems in economic terms. The chapter covers external costs and benefits, the consequences of externalities for equilibrium price and quantity, and market failure due to a lack of property rights. The author indicates that property rights over the environment are an institutional arrangement hindered by transaction costs and discusses the role of property right allocations in solving the problem of 'commons'. Even if property rights are perfect, the author explains, other principles of environmental problems remain, such as the discount rate applied by

individuals and the distribution of income. Finally, the chapter emphasises that it is not just market failure behind the problem but government failure as well.

Chapter 4, 'The Environment We Want: Optimality or Sustainability?' is pivotal to the book. It sets up the analysis of optimal environmental quality in a static and dynamic context using marginal private benefit and marginal external cost curves. The irreversibility of projects and uncertainty involved in calculating costs and benefits are explained. It is here that the author first calls for ethical judgements at the micro decision level. The concepts of 'sustainability' and 'sustainable development' are then developed. This section covers the ideas of 'weak' and 'strong' sustainability as well as the 'critical natural capital' idea. The conclusion of the chapter is that the concept of sustainable development is not a precise decision rule but 'emphasises the need to take full account of long-term irreversible effects and of the need for caution in decision making, particularly where there is uncertainty and the effects are of potentially great magnitude' (p. 57). This concept of sustainability resembles the 'precautionary principle' that is alluded to but not explicitly explained in the text. This is a shortcoming as students relate to the 'precautionary principle' well. The concept of sustainability amounts to the need for judgement at the individual decision level after economic analysis prepares the costs, benefits and options. This the author calls 'the ethical basis for choice' and it is clear that economists can inform but not judge. This theme is referred to throughout the book.

As mentioned, another role for economists is to convince policy-makers of the need for change. The author considers that an important component of this, and the analysis to be carried out, is 'Valuing the Environment', the title of Chapter 5. This is a well-written chapter covering most valuation methods in the revealed and expressed preference classes as well as the 'value of value estimates'. The strengths and limitations of each valuation method are clearly explained.

Chapter 6, 'The Options for Environmental Management', looks at the principles of environmental management in terms of 'negotiating solutions' and the 'polluter pays principle'. It then moves on to policy options to solve environmental problems, covering command and control, pollution taxes and pollution permits. It also includes what would have been a clear explanation of the workings of pollution permits in achieving cost efficiency but for a mistake on p. 97. A permit system offers cost efficiency because low-cost abaters can sell their permits to high-cost abaters so the total cost of abatement is minimised. Unfortunately the book indicates that 'whenever Firm A can abate at lower cost than Firm B then it will be profitable for Firm B to sell its permit to Firm A' (p. 97). This of course means that high-

cost abaters will have to abate more. There is also a mistake on p. 93 in Figure 6.3. Although there is a Figure 6.3 (a) and (b), these diagrams are exactly the same so the explanation does not make sense.

Chapter 7, 'The Uncertain Road to Environmental Policy', covers the political economy aspects of environmental problems such as international coordination of global environmental problems where game theory is used, informally, to explain the problems of incentives to abate when other countries do not.

In Part II of the book, the following case studies are considered: air pollution and acid rain, the economics of the countryside, the rainforest frontier, and climate change. These all link in well with the principles and policies established in Part I and especially with the sustainability concept. Although they are not Australian case studies, addressing issues relevant to English environmental problems, they do relate to Australian issues and three of the case studies have global aspects and thus are relevant to Australia.

This book is intended as an introduction to non-economists of how economics can assist in environmental protection. However, its most valuable use may be as a pre-subject reading for second or third year environmental economics subjects. That is, for those students who have a limited knowledge of economics to get a quick grasp of the basics of environmental economics. In the same vein, it would be useful as a pre-subject reading for those students from other disciplines attempting environmental economics at an honours or post-graduate level.

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*Operationalising Sustainable Development: Economic-Ecological Modelling for Developing Countries*, by Kanchan Chopra and Gopal K. Kadekodi. Published by Sage Publications, New Delhi/Thousand Oaks/London, 1999, pp. 301, ISBN 81-7036-795-6.

This is the twenty-second volume in a series of studies undertaken under the Indo-Dutch Programme on Alternatives in Development (IDPAD). The volume presents an economic-ecological model for sustainable development. One needs knowledge of modelling to understand the methodological part of the book, which uses a fair amount of technical jargon.

Chapter 1 provides a survey on alternative modelling approaches and strategies for operationalising sustainable development. Various approaches to modelling are then described to provide a background to the ecological-economic model for Palamau, one of the most backward districts in Bihar state in India. It also makes a comparison of various models while linking them with sustainable regional development.

Chapter 2 describes the study area covering ecology, economics and development of Palamau. It provides information on location, topography, climate, ecology (hills, rivers, flora and fauna), economy (population, land use pattern and irrigation system), industry and infrastructure. Chapter 3 specifies a resource-based ecology-economy model for Palamau. The model incorporates the salient features of the study area such as the natural resource and production links, production and consumption links, external flows of natural resources, public and private investment patterns, livelihood conditions and status, economic pressure on ecology and vice versa, and development policy options. The focus of the model is on arriving at a time path of ecology-economy interactions through a time series of simulations in the time domain. The model is developed further in the following chapters.

Chapter 4 deals with water in Palamau. In this chapter, existing water resources are described. It also discusses the water module and the sources of data for the variables and parameters used in the water module. Chapter 5 is about forest resources and their modelling. It analyses the inter-links between economic and ecological factors affecting forests. It also studies the effects of commercial and basic need demands on the area, density, biomass and biodiversity characteristics of forests in Palamau.

Chapter 6 is used to analyse growth of livestock, its forward links with final consumption of milk and meat, and inputs such as manure and draught power, and its backward links to demand for water for drinking and washing and biomass as feed. The chapter also provides details of the livestock module. Chapter 7 deals with the agricultural economy of Palamau. The agricultural module is presented, which determines output and input levels for three crop groups.

Chapter 8 studies the income, aggregate consumption and basic needs demand patterns in Palamau region, linking to the availability of resources as well as changes in it, and to the economic, political, cultural and institutional forces that operate in the region. Chapter 9 examines the implications of allowing the existing patterns of resource use and livelihood patterns to continue in the context of sustainability.

Chapter 10 presents the *Cyclic System of Development*. The *Cyclic System of Development* is a translation of the original Hindi version *Chakriya Vikas Pranali*. Its objective is to promote sustainable development at the village level, starting from natural resource management

through people's participation. Chapter 11 examines alternative policies for correcting unsustainable situations of over-exploitation and/or under-utilisation of resources. Chapter 12 provides a summary and the major conclusions from the Palamau study.

This book is a valuable contribution to the resource economics literature and will be of interest to those working in resource economics, development economics and ecology. The book would also be useful for planners, policy-makers and administrators.

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*Biodiversity in Agroecosystems*, by Wanda W. Collins and Calvin O. Qualset. Published by CRC Press LLC, Boca Raton, Florida, 1999, pp. 334, ISBN 1 56670 290 9, \$US59.95.

Of all the global environmental problems, what to do about the loss of biodiversity is particularly intractable. Despite a global convention and a funding conduit (the Global Environment Fund) plus a range of other treaties and agreements governing and regulating the rights and uses of wild species, too many questions remain unanswered. For a start, beyond broad categorisation covering genes, species and ecosystems, there is little agreement about what is becoming extinct and what the impacts actually might be. The appeal of charismatic mega fauna, potential plant genetic improvements and pharmaceutical mega values are often cited as good reasons for more conservation expenditure. Yet even here, the cases are disputed and often anecdotal.

Next, the question of where diversity is, a question pitching developed against developing nations, is largely unresolved. By extension, the issue of global conservation priorities emerges as a confusing mishmash of political compromises. Add a range of disciplinary research agendas and NGO inputs, and one has a surefire recipe for lively discussion, if not a policy agenda.

Despite this confusion there is a consensus that biodiversity, along with air and water, qualifies as what the sustainability jargon has termed 'natural critical' capital. Biodiversity is vital to all life support systems and its study encompasses a wide range of scientific and social science disciplines. This is hardly surprising since much biodiversity is land based and its conservation



competes with a range of other land uses. An understanding of these competing pressures is therefore a vital prerequisite for influencing the fate of much of the world's biodiversity. Since 30 per cent of the world's area falls under agriculture, it seems reasonable to focus on the sector. The role and analysis of what might be called agro-ecology are the point of departure for the current book, a fascinating collection of papers discussing the relationship between and integration of biodiversity and agricultural practice.

The book asks two broad questions: what does biodiversity contribute to agriculture? and what does agriculture do to biodiversity? A necessary prerequisite for considering these questions is an understanding of what various scientists understand to be the essence of biodiversity and its contribution to agro-ecosystem functions. Accordingly, several chapters answer these questions from the lowest level of microbial diversity indicators, working upwards to consider the nature of agro-ecosystems as planned mosaics mixing crops and livestock with associated naturally occurring wild species. At each level the measurement of biodiversity is considered. Equally important is the functional contribution of these diversity levels to basic direct and indirect processes that sustain a wider productive unit. This functional contribution includes an appraisal of the delicate interactions between planned (crop and livestock) and associated (wild) biodiversity, and how these interactions work in alternative agroecosystems such as rangeland, agroforestry or the periurban fringe. An associated policy consideration is how policy stimuli driving the planned element are impacting on wild systems and the resilience of the feedback loops that might actually be gluing everything together. Thus, several chapters emphasise the driving forces and pathways of loss through *inter alia* the excessive use of pesticides and other intensive practices. The potential for alternative less damaging interventions emphasising Integrated Pest Management or natural ecosystem management is also explored.

A far wider understanding of the role of the biodiversity hierarchy in agriculture emerges from this book and several interesting economic angles are implicitly or explicitly addressed. Implicit are the twin themes of common property and externalities. A recurring fact is that what we do to the planned element (i.e. using modern agricultural methods) of the world's surface inevitably impacts upon the unplanned. But the unplanned needs to be nurtured so that the planned maintains some resilience. This holds true for basic farm management through to the use of transgenic crops or genetic resources for farm animal improvements. Second is the explicit consideration of biodiversity value. Either *in situ* or *ex situ*, valuation warrants the attention of economists since the global value of biodiversity is the implicit answer to why we should consider its fate. The value of *ex situ* collections has for some time been the preoccupation of plant breeding establishments

desperate to justify public subsidy. The issue of *in situ* conservation value is now central to the arguments for justifying global and national conservation spending. Accordingly, the chapter by Gollin and Smale provides a very useful introduction to recent thinking on valuation methods.

This book provides a clear overview of the essentials of biodiversity in agriculture but assumes some familiarity with the policy contexts that prevail in different parts of the world. A policy chapter outlining the different pressures underlying extinction would have been a useful addition. Some of the chapters are necessarily repetitive in their reiteration of the scope of the 'biodiversity crisis' and in calling for more research. However, none of these observations detracts from an excellent and highly accessible collection of papers that should be read by anyone who wants to understand the fundamentals of agricultural diversity.

A stickler economist might still wonder how questions of economic efficiency could be brought to bear on this whole messy area. While providing some clues, the limited economic input — beyond valuation — would suggest that there is still a lot of room for more economists to get involved.

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