

## Book reviews

*Farmers, Scientists and Plant Breeding: Integrating Knowledge and Practice*, edited by David A. Cleveland and Daniela Soleri. Published by CAB International, Wallingford, UK, 2002, pp. xii + 338, ISBN 0 8519 9585 3 (hdbk), £55.00.

Globalisation has increased interest in Indigenous or traditional knowledge in many areas, including agriculture and plant breeding. Although farmers were the first plant breeders, the development of modern scientific plant breeding has meant that breeding has become increasingly separated from farmers. The gap between scientific plant breeders and farmer breeding through local selection of varieties seems widest for small-scale farmers in marginal environments with limited resources. This book examines the nature of farmers' and scientists' knowledge and practice, the similarities and differences between them, and how they can be successfully integrated into plant breeding.

The 12 chapters are written by social scientists (anthropologists, ethno-ecologists, agro-ecologists, economists and geographers) and plant breeders. The authors encompass a range of theoretical and methodological approaches and case studies from around the world. The book is organised in two main parts, the first (with five chapters) on farmer plant breeders and collaboration, and the second (six chapters) on scientific plant breeders and collaboration.

The first three chapters describe and define the issue and provide a setting for the later contributions. Cleveland and Soleri (Chapter 1) examine the possibility that local knowledge and local systems of resource use and conservation are environmentally, economically and socially more sustainable than modern, industrial systems. The authors provide a useful description of plant breeding for the non-scientist, and describe the development of 'participatory plant breeding', which aims to make formal science more useful to farmers. The activities which can be included in participatory plant breeding range from on-farm trials in which farmers discuss selections among potential new varieties with the breeder, to decentralised farmer-led breeding in which the aims and structure of the breeding program are devised by farmers with their particular needs in mind. In Chapter 2, Soleri and colleagues describe detailed farmer surveying carried out in several countries to determine the extent to which farmers know and understand key concepts in plant breeding. They found that farmers'

knowledge can provide information that is useful and relevant for collaborative plant breeding. In Chapter 3, Smale provides economic perspectives on the importance of collaborative plant breeding for on-farm conservation of genetic diversity. Smale introduces economic concepts for non-economists, particularly the incentives to farmers in maintaining genetic diversity, and argues that varieties have both a private value as seed and a public value as a genetic resource.

In Chapters 4 and 5, Zimmerer and McGuire examine the way in which small farmers manage diverse mixes of varieties, based on complex preference systems and diverse production environments, for potatoes in the Andean region and for sorghum in Ethiopia, respectively. They conclude that benefits to poor farmers in terms of the desirable mix of varietal characteristics for their needs would be increased by greater recognition from breeders of the social factors that lie behind farmers' preferences and seed markets.

In Chapter 6, Frossard presents a more strident examination of how farmer-scientist cooperation in rice in the Philippines developed out of farmer opposition to the negative aspects of the high-input 'green revolution' technologies. Frossard argues that scientists devalued farmer input, but that the new cooperative arrangements have rediscovered the value of this important resource. This chapter makes interesting reading for those who regard scientific method as value-free, objective and seeking universally applicable truth. Unfortunately, its value-laden and personalised style makes it difficult for the reader to give this chapter equal weight with other chapters with more objective styles. Nevertheless, Frossard's challenge to the international agricultural research system as being unresponsive to farmer interests provides an interesting contrast to chapters by Banziger and Ceccarelli, who outline the international system's practical involvement with collaborative plant breeding. Disappointingly, we are left to wonder at the reasons for these divergent viewpoints, with no attempt made by the editors to bring the totally opposing views into context or to provide us with a basis for seeing whether the differences reflect differences between crops, locations or simply the disciplines and backgrounds of the authors.

The chapters by Schneider and Duvick discuss issues relating to developed countries. Schneider describes the farmer-based selection methods used by early Swiss wheat breeders, during the formative phase of plant breeding in their country, in contrast to the subsequent centralised and regulated systems. Duvick provides a developed country perspective on on-farm variety trials and farmer-to-breeder feedback as a means of incorporating farmer preferences into scientific breeding.

In Chapters 9 and 10, Rios and Joshi and their colleagues describe and assess national participatory plant breeding approaches for pumpkins in Cuba and rice in Nepal, respectively. In both cases, farmer participation has

been very successful in overcoming local problems. Joshi devised tests of selection by farmers and breeders, and examined reasons for the differences in the lines selected, as well as the cost-effectiveness of different approaches.

In the final two chapters, international participatory plant breeding programs are described. Banziger and de Meyer describe the International Maize and Wheat Improvement Center's (CIMMYT) extensive collaborative maize breeding program in southern Africa. They conclude that collaborative plant breeding can develop more appropriate varieties for a highly variable, stress-prone target environment that is hampered by resource constraints. In Chapter 12, Ceccarelli and Grando provide some lessons from their work at the International Center for Agricultural Research in the Dry Areas (ICARDA) with farmers in West Asia and North Africa. They outline the background to, and the development of, the decentralised breeding in the barley program at ICARDA. This program relies on decentralised selection and testing to identify varieties that will reflect different market requirements and farmer needs. They argue that decentralised participatory plant breeding is simply a different way of applying the same set of principles and breeding theories to address specific needs.

The later chapters raise the issue of broad versus specific varietal adaptation, or the relationship between the environment in which selection is made and the target production environment. After initial emphasis on broadly adapted varieties that would succeed in all environments, the need for more specific adaptation to address particular environmental and local demand conditions has increased, particularly for marginal environments. Participatory plant breeding has therefore become increasingly relevant for modern plant breeders.

The advantages reported for both breeders and farmers from participatory plant breeding come from including consumption preferences as well as requirements and preferences of farmers as producers and processors. For developed countries, where production and consumption are separated activities, participatory breeding therefore involves consultation and collaboration with farmers, processors and consumers.

Interestingly, the decentralisation of selection within a participatory breeding program is in stark contrast to the centralisation and consolidation of plant breeding currently being undertaken in most major crops in Australia. Research administrators working to establish more centralised breeding programs would find many challenging ideas amongst these varied papers. They would, however, be encouraged by the papers that argue that on-farm evaluation is the only means of developing and assessing new technologies.

Although this book is written in non-technical language, some readers might find the extent of acronyms and abbreviations irritating. The book

could have benefited from having a glossary of terms to assist the reader who might dip into parts of the book rather than reading it as a whole, because many do not appear in the disappointing index. Otherwise, the standard of technical editing is very high. However, the style, particularly the use of the first-person and the extent of detailed end-notes, varies sharply between chapters, making the final product seem less of a cohesive whole than might have been hoped for.

This book documents an increasingly important direction for agricultural research that recognises the requirements and preferences of client farmers and consumers. All involved in plant breeding, whether in funding, breeding or economic evaluation, will find something of importance and interest in this book. Economists assessing technology adoption will also find much of interest.

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*The Economics of Conserving Wildlife and Natural Areas*, by Clem Tisdell. Published by Edward Elgar Publishing, Cheltenham, UK, 2002, pp. x + 308, ISBN 1 84064 811 2 (hdbk), £59.95, US\$90.

In *The Economics of Conserving Wildlife and Natural Areas*, Clem Tisdell applies economic reasoning to a wide range of conservation issues, from conceptual issues relating to sustainability and biodiversity to specific cases about wildlife management and protected areas. The book contains 24 separate essays as chapters, all of which have Tisdell as author or coauthor. These chapters include a short introduction and overview, two previously unpublished studies, and 21 previously published papers. The latter works appeared in a variety of outlets: book chapters, papers in conference proceedings, articles in economics journals such as *Marine Resource Economics*, *Australian Economic Papers*, and *Ecological Economics*, and articles in interdisciplinary environmental publications such as *The Environmental Professional*, *Coastal Management*, and *Environmental Conservation*.

The book is organised into four sections: An Overview, General Issues in Biological Conservation, Economics of Conserving Wildlife Species, and Conservation and Use of Natural Areas. Overall, the book depicts a long career that has generated a substantial body of literature applying economics to conservation.

Throughout the book, Tisdell successfully argues that biodiversity conservation and wildlife management necessarily involve multiple disciplines.

This point of view is explicit in his essays on biodiversity. It is also implicit in the attention that he pays to particular socioeconomic, institutional, and biological detail in his case studies. These details are among the most interesting features of the book, and there is a strong sense that sometimes traditional benefit-cost analysis promotes conservation. However, the essays in this volume also suggest that when traditional economic tools do not favour conservation, one need only look to other disciplinary perspectives. Unfortunately, Tisdell provides little guidance on how to weight the concerns from these various disciplines.

For the non-economist, these papers illustrate the applicability of a wide range of economic principles to wildlife management and protected areas. Through discussion and examples, the reader is exposed to topics such as basic supply and demand reasoning, normative theory, externalities, Pigovian fees, public goods, the free rider problem, open access and common property resources, and simple bioeconomic modelling. Although not written as a textbook, the readings have pedagogical value for the non-economist because they appear with minimal technical detail and rely primarily on graphical analysis.

For the economist, these essays provide numerous examples of using our tools to explore heterogeneous conservation questions. In particular, Tisdell provides some fascinating case studies in the economics of biological resources that have both consumptive and non-consumptive values, including kangaroos, elephants, sea turtles, dugongs and minke whales. His case studies also involve different regions of the world with diverse resource management institutions. Examples include Australia, Papua New Guinea, Sri Lanka, Indonesia and China. Along the way, Tisdell provides some biological and institutional details that are inevitably important for management. For that reason, economics students wishing to study biological resources should find this collection interesting.

Although the breadth of topics in this volume is impressive, the overall importance of this work is unclear. The book fails to address contemporary scholarship on the economics of biodiversity. For instance, there is no mention anywhere in the book about the work of Stephen Polasky, Martin Weitzman, or Jason Shogren, to name just a few economists who have published widely on biodiversity. Similarly, the book fails to address contemporary thinking about sustainability and leaves off essentially in the aftermath of *The Limits to Growth* debates from the early 1970s. With the interdisciplinary orientation of the author, most notably absent in this collection is any mention of adaptive management. Of course, some original material in this book predates contemporary work, but the author could easily have addressed contemporary scholarship in a longer introduction or in short chapters at the beginning of each section.

The most substantial shortcoming of this volume is the way in which Tisdell and the publisher present the material. As most of this book is reprinted material, topics are repeated across chapters. The reprinted work has not been reset by the publisher so that the articles appear just as they did in their original forms. Therefore, the typeset is annoyingly mismatched across the collection, and in some cases the type is extremely small. This is unjustified in light of the substantial price for this volume. Some articles also have two sets of page numbers – one for the journal and one for this volume. Although there is some advantage to this approach because one can easily quote the original source from the collected material, the presentation suffers too much for the modest gain in convenience. More importantly, the introduction does not successfully tie all of the chapters together, but mainly serves only to summarise them. As a result, the reader is left with only vague take-home messages rather than strong conclusions based on a career's work in this area. Nevertheless, because these papers originally appeared in such a wide range of outlets, no individual would easily have access to all of this material. In that sense, the book's biggest weakness is also its strength.

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*Agricultural Research Policy in an Era of Privatization*, edited by Derek Byerlee and Ruben G. Echeverría. Published by CABI Publishing, Wallingford, UK, 2002, pp. xix + 300, ISBN 0 851 99600 0 (hdbk), £49.95, US\$75.

The changing roles of public and private funding of agricultural research are considered in this book of 14 chapters. The primary focus is on the trends in R&D expenditure, research-related policy issues and the current environment for investment in developing countries, with experiences from industrialised nations addressed for comparison. The book draws on the considerable knowledge of well-known authors who have detailed information on agricultural research systems throughout the world. Given that a number of interested readers would be non-economists, it is good to see that the economic reasons for (i) the public funding of agricultural research in general (Chapter 1) and plant breeding research in particular (Chapter 11); (ii) the imposition of commodity levies (Chapter 4); and (iii) private-public collaboration of research investments (Chapter 7), are discussed.

The chapters are organised into four parts. A detailed and informative introduction precedes Part I. Here, Byerlee and Echeverría provide the reader with a useful synthesis of the past and current status of agricultural

research policy, as well as a guide to the contents of each chapter. This introduction and overview enables the reader to obtain a clear picture of trends in public and private funding of agricultural R&D over time and across countries, and of the major lessons that can be learnt by comparing and contrasting the different situations.

Part I is aptly called 'Setting the Scene'. It consists of two chapters, which provide a global setting for the country-specific case studies that are contained in the remainder of the book. In Chapter 1, Byeree, Alex and Echeverría review the rapid changes in investment in public research systems in developing countries that have occurred since the 1960s. They highlight the emergent trends, the critical challenges being faced, and the various ways public research systems are addressing these issues. In Chapter 2, Pray examines the increasing role of the private sector in agricultural research. Pray concludes that private research can grow rapidly if the right economic and institutional conditions exist, such as rapid growth in agricultural markets, strengthening of intellectual property rights and liberalisation of input markets. Such conditions are generally more prevalent in industrialised countries than in the developing world. Factors impeding growth in private investment include low agricultural prices, growing environmental and health concerns about biotechnology, and declining levels of public investment in many countries.

Private funding of agricultural R&D through producer organisations is the focus of Part II, which consists of four chapters. In Chapter 3, Brennan and Mullen provide an overview of joint government and producer funding in Australia. They describe the research levy system, the contribution of Australia's Research and Development Corporations in priority setting, and the lessons that could be learnt from the Australian experience. This chapter provides a good backdrop for the remaining three chapters in Part II, which examine farmer (and industry) funding of agricultural R&D in Columbia (Chapter 4 by Estrada, Holmann and Posada), Africa (Chapter 5 by Kangasniemi) and Uruguay (Chapter 6 by Allegri). Combined, these country-specific case studies highlight the benefits from farmers directly contributing to agricultural research in developing countries compared with mainstream public funding, particularly in terms of increasing revenue, meeting the long-term needs of the farmers, and raising the quality of the research undertaken. The limitations of using farmer levies to finance research are also addressed. A significant limitation in the poorer developing countries is that, because a levy is collected at point-of-sale, a levy system cannot be applied to non-commercial staple crops, which make up most of the production in these countries.

Another means of financing agricultural research is through public-private collaboration (PPC). The variety of approaches used to carry out

this form of collaboration are documented in the three chapters of Part III, indicating that the preferred approach will depend on a number of factors such as the degree of mutual trust, the legal and institutional frameworks in place, the willingness and capacity of both sectors to adjust to a collaboration culture and so on. Not surprisingly, with so many factors at play, the level of success has also been quite varied. Van der Meer discusses the relatively formal approach to PPC adopted in the Netherlands, and the initiatives that were introduced in the 1990s to strengthen the collaborative approach (Chapter 7). In contrast, Ekboir and Parellada discuss the history of zero-tillage in Argentina in terms of the relatively informal contractual and financial arrangements between public and private agencies (Chapter 8). Hall, Sulaiman, Clark, Sivamohan and Yoganand examine the limited but growing number of cases in Indian agricultural research (Chapter 9) where either the public sector actively engages the private sector to commercialise the new technology, or where the public sector undertakes research in response to a request from, or a contractual arrangement with, the private sector. The reader is left with the impression that while potential for PPC exists, a number of limiting factors will need to be addressed before this potential is fully realised. Once again, this is especially true for developing countries.

The five chapters which make up Part IV focus on various aspects of public sector response to privatisation. The topics covered in this broad area include privatisation of plant breeding in industrialised countries (Chapter 10 by Heisey, Srinivasan and Thirtle), and in developing countries (Chapter 11 by Morris and Ekasingh), managing intellectual property and income generation in public research organisations in the developing world (Chapter 12 by Fischer and Byerlee), research reforms in China's agricultural sector (Chapter 13 by Huang, Hu, Pray and Rozelle) and using competitive funds to finance agricultural research (Chapter 14 by Echeverría and Elliott). From the case studies provided, it is clear that there has been an increase in private funding of plant breeding research in recent decades at the expense of public funding, largely because of the possibility of income generation through strengthened intellectual property rights, the development of hybrid seeds and biotechnology. This has led to questions regarding the future role of the national and international public research organisations in plant breeding (including the International Agricultural Research Centres which have historically played a leading role in plant genetics) and the reforms that are needed if publicly funded organisations are to invest in areas and at levels that are socially optimal. Given the conflict between the need to alleviate the demands on public finances through commercialisation of research and ensuring that such commercialisation is in the public interest and doesn't crowd-out private investment, reform has been slower



than expected. Moreover, the evidence from the case studies indicates that public sector reform in the areas of intellectual property rights and plant breeding has not resulted in expected levels of increased funding. This is, in part at least, because public funding bodies do not have the specialised skills in intellectual property rights and business management that are necessary to enter into successful partnerships with the private sector. Finally, as pointed out by Echeverría and Elliot (p. 282), competitive grants may improve the efficiency of resource allocation in research but they are not a panacea for the problem of limited agricultural R&D funds.

Overall, this book provides a detailed review of the issues and challenges facing public sector organisations in an era of privatisation. Its coverage is broad both in terms of the various types of public-private partnerships in research discussed and the range of country-specific case-studies presented. I believe that policy makers, donors and researchers who work in the area of public research policy and development would find this book interesting and useful.

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*Globalization and Its Discontents*, by Joseph E. Stiglitz. Published by W.W. Norton and Company, New York, 2002, pp. xxii + 282, ISBN 0 3930 5124 2 (hdbk), US\$24.95.

In *Globalization and Its Discontents*, Joseph Stiglitz reviews the mistakes of the International Monetary Fund (IMF) in dealing with economic crises in a globalising world and in helping economies make a transition towards capitalism and openness. Stiglitz, the winner of the 2001 Nobel Prize in Economics, has served as an economic advisor to President Bill Clinton and as Chief Economist of the World Bank. This book is, therefore, a rare opportunity to learn from someone with both exceptional academic achievement and frontline policy experience concerning the complex topic of globalisation, which is arguably one of the most ill-defined and misused economic terms today.

Four central themes emerge from the book. The importance of ideology and politics as a driving force for IMF policies is the most central of the book's themes. Stiglitz's perception that international organisations misuse their power to garner support and obedience from IMF-funded countries is the second main theme. The third theme is that economies in crisis and in transition have poor role models, given that countries like the USA, Japan and the European Union tend to disregard standard IMF prescriptions in their own domestic policy deliberations. The final theme of the book concerns

the author's call for the creation of institutions to provide support for nations in economic transition through careful sequencing of policies.

Stiglitz recounts how the founding ideology of the IMF and the World Bank involved aiding countries in the promotion of expansionary policies, because markets often fail to heal economies in crisis. However, he contends as follows that the IMF has strayed and has begun to promote a new ideology:

Today, however, market fundamentalists dominate the IMF; they believe that markets by and large work well and that governments by and large work badly. (p. 196)

The new ideology is characterised by Stiglitz as a threefold mantra: countries must have fiscal austerity, markets should be liberalised, and businesses privatised. This set of policy prescriptions is referred to as the 'Washington Consensus', because they are supported by three Washington organisations: the IMF, the World Bank and the USA Treasury (p. 16). While he does not deny the importance of these policies, he questions their strict formulation, because countries are often ill equipped to handle major restructuring of institutions and markets, and the gaps created by the dismantling of archaic institutional structures cannot be filled overnight.

Thailand is an example of a country that was unprepared to handle a dramatic transition. As part of the Washington Consensus, capital market liberalisation was consistently promoted by the IMF, and this is the policy that Stiglitz cites as the 'single most important factor leading to the East Asia Crisis' (p. 99). When market controls on capital were relaxed in Thailand, markets became subject to speculative behaviour and there was a decrease in public investment. The liberalised markets allowed capital to quickly flow in and out of the country, but not necessarily for the benefit of the Thai people.

The strict formulation of such policy prescriptions also overlooks how the transformation to a market economy requires more than just a changing of economic structures. It also involves changes in social and political structures. This is the lesson Stiglitz presents from the Russian economic crisis. The Washington Consensus pushed price liberalisation, a tightened monetary policy and high interest rates in Russia. This shock-therapy style of treatment was implemented in order to improve market incentives and economic efficiency. However, these policies ended up weakening the economy, and gross domestic product consistently fell after reform. The author also contends that newly privatised firms with political power manipulated a poorly defined legal system to their advantage, which occurred in the example of the loans-for-share program (p. 159).

If the Washington Consensus ideals were wrong and created havoc, why was help from the IMF sought and their policies followed? The answer to

this question comprises the second main theme of the book. Stiglitz portrays international organisations like the IMF as using tools, such as coercion and intimidation, to gain support for their economic prescriptions. He describes how South Korean officials kept quiet even though they disagreed with IMF policies, because they knew support would otherwise be denied and their international image would be tarnished accordingly. Stiglitz describes how coercion also occurs through a 'bail in' strategy. For example, when Romania sought aid from the IMF, it was forced to first raise money through the private sector. Also he suggests that Michel Camdessus, the former managing director of the IMF, intimidated and bullied the Indonesian President Suharto into signing a letter of agreement between Indonesia and the IMF.

The hypocrisy of policies adopted in developed nations given the policy demands placed on the developing world is the third main theme of Stiglitz's book. For example, the author argues that the USA does not follow the prescriptions of the Washington Consensus. The most important contravention of these prescriptions concerns the intervention of the USA Government in markets. For example, the author discusses the support of the USA Government in the formation of a cartel to control aluminium output, after a fall in its world price. Also a producer of aluminium, Russia, was hesitant to agree, and instead of receiving accolades for supporting free markets, was threatened with an antidumping case. Eventually the cartel prevailed, and Stiglitz argues that the global costs of the cartel were much higher than the loss in consumer welfare. Russia, an economy in transition, learned that government intervention was supported in practice, even in a free market economy.

The final theme presented by Stiglitz is clearly argued, as it lies at the heart of the author's work in information economics. He calls for a new era of policies, one with credible and workable reforms currently not found in the standard recipe books. These new policies should result from knowledge, understanding and a thoughtful sequencing of events. He argues that partnerships between markets and governments can produce good policies through debates, collective action, and trust. The author states that:

There are alternative strategies – strategies that differ not only in emphases but even in policies; strategies for instance, which include land reform but do not include capital market liberalization, which provide for competition policies before privatization, which ensure that job creation accompanies trade liberalization. (p. 87)

In *Globalization and Its Discontents*, these four main themes are presented specifically, but many of Stiglitz's examples and insights are consistently repeated throughout the book's nine chapters without providing readers with a critical discussion of the issues. These themes are often presented as

facts instead of the opinions and perceptions of the author. In Chapters 4 and 5 devoted to providing explicit examples from East Asia and Russia, he only provides the readers with examples of IMF mistakes, as well as policies that he believes should have been proposed. In this section of the book, it appears that Stiglitz is not able to disconnect himself from these economic reforms in order to provide a critical analysis of the situation. From Chapters 6 through 8, Stiglitz attempts to further the evidence of IMF unfair practices and its misdirected agenda. This section, however, is very similar to the earlier part of the book, because the examples provided appear to be carbon copies of ones presented previously. Therefore, the main body of the book serves only to present various examples of IMF blunders, when it could have provided readers with a more introspective and in-depth view of globalisation. Nevertheless, the reader will be able to glean many of the main ideas in the first three and final chapters of the book, which are clearly written and well organised.

By dwelling only on the injustices perpetrated by the IMF during his term as Chief Economist at the World Bank, Stiglitz appears to be providing the reader with a skewed version of the globalisation story. Also, by introducing a multitude of examples without developing his themes beyond that achieved in the main body of the book, I was left wondering if he had presented the whole story. Certainly, the book provides readers with the invaluable opinions and insights of a Nobel Prize winner with unique experiences of how globalisation has worked in practice. However, the lack of development of his themes distracts the reader from his call for change.

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*Economics and the Global Environment*, by Charles S. Pearson. Published by Cambridge University Press, Cambridge, UK, 2000, pp. xxii + 582, ISBN 0 5217 7002 5 (hdbk), \$85.

Pearson's book is well written and designed to bridge at least some of the disciplinary gap that exists between environmentalists and economists. The objectives of his book are set out in an introductory chapter that provides a clear exposition of basic principles and concepts, a cross-disciplinary perspective and an overall objective of linking environmental management issues to trade theory. Pearson argues these elements are a central part of an emerging subdiscipline called 'international environmental economics'.

The arguments in the book are based on conventional microeconomic theory and their thrust is to develop microbased principles for dealing with

a range of international environmental problems. The book is in four parts. Part 1, called 'Basics' covers elementary theoretical concepts familiar from many previous resource economics texts. Part 2 covers the relationship between trade and the environment and 'melds' principles from trade and natural resource economics. Part 3 covers international pollution issues such as global warming, and competition issues such as those occurring in international fisheries. Part 4 discusses sustainable development.

It is useful to discuss some individual chapters to get the flavour of the book. Chapters two to six describe the relationship between the environment and the economy and the usual market failures such as public goods, externalities and common access, intertemporal issues and optimal pollution levels. These five chapters provide an excellent introduction to these topics supported by figures and some algebra in appendices. The discussion of discounting in benefit–cost treatments of environmental problems is the best I have come across and leads into intergenerational issues dealt with later in Chapter 16. Pearson comes across in these chapters as having a deep insight into this area of theory and being able to communicate it.

The chapters in Part two provide a synthesis of trade and environmental economics ideas in a series of theoretical models that capture environmental effects. These models are presented as geometric figures and are reasonably accessible. In Chapter 10, a taxonomy of trade issues, published originally by the Organization for Economic Cooperation and Development (OECD), covers competitiveness questions, environmentally related product standards, trade measures to achieve compliance with environmental regulation, and the environmental consequences of changing trade patterns among other issues. Chapter 11 provides a useful environmental perspective on institutions such as The General Agreement on Tariffs and Trade (GATT), World Trade Organisation, OECD, North American free Trade Agreement (NAFTA) and the European Union.

The treatment of trade and environmental policy in Part three is captured in this quote from Chapter 10 on page 258: 'At a high level of generality there is no fundamental conflict between good trade policy and good environmental policy. Both require the internationalization of the full costs of production including environmental protection costs ...' (p. 258) That is, the application of marginal conditions from trade and natural resource theory can lead to resolution of international environmental issues. Chapters 14 and 15 provide examples of the application of these principles using global warming and fishery access problems. These and other case descriptions are used to illustrate the economic principles developed earlier in the book and have excellent contextual background information on scientific, legal and political aspects. The reader is left with no doubt that negotiation is at the heart of conflict resolution in international trade issues. The book provides

intuitive descriptions of negotiation processes in the text and a more technical algebraic treatment of negotiation in an appendix.

Chapter 16 broaches the conceptually difficult area of sustainable development, starting with a balanced discussion of problems defining the word 'sustainable'. Chapter 17 covers green national accounting. Chapter 18 is the only chapter written by another author, and considers environmental issues in the development of the Thai economy. Chapter 19 draws together many of the threads of the book in a conclusion.

The principal achievements of the book are threefold. First, it provides a melding of international trade theory and environmental economics into a workable and reasonably simple framework suitable for policy analysis. Second, the legal, institutional and political constraints on protecting the environment in the context of globalisation are well covered. Third, the book has genuine breadth in the discussion of major global institutions such as WTO and GATT, the scientific background to global warming, measurement of non-priced values, negotiation processes and the like. However, those looking for a paradigm shift will be disappointed. The book is firmly grounded in the work of neo-classicists such as Hotelling and Hartwick and is based on marginal analysis. Perhaps the only consolation in this regard is that the author is open and discursive about doubtful areas in the economic approach and about resulting uncertainties surrounding popular issues. This is unusual in a resource economics text.

*Economics and the Global Environment* would be accessible to most tertiary educated readers interested in international environmental problems. Some of the economic models would require background in microeconomics. However, these parts are written with the vocational needs of students in mind and most could be skipped by a general reader at little cost. For teachers, the book would be useful as a text in a unit that emphasised global environmental problems such as global warming, fishery management and transnational pollution problems. It would be suitable at 200 level for economics majors, or for 300 level for science and law students if it were supported with a lecture or tutorial program based on the theory in Part 1.

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