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# Book reviews

**Bioenergy Options for a Cleaner Environment: In Developed and Developing Countries R.E.H. Sims, (Ed.), 2003. Elsevier Ltd., Oxford, UK, 184 pp. hardback. Price: US$99.00(hardback) ISBN 0-08-044351-6**

This book addresses the goal of a cleaner environment from the standpoint of the burgeoning science of bioenergy. The book's six chapters were written by a panel of international experts of a 1999 World Renewable Energy Congress in Kuala Lumpur. Each chapter is written more or less in a paper format, with an introduction, conclusions and references section. While each chapter has a different subject and can be read independently, the chapters are very well cross-referenced and may also be read sequentially.

The book begins with an excellent introduction to the topic, entitled '*Biomass and resources*'. The author discusses a range of biomass products (including energy crops and crop residues, animal wastes, municipal solid waste, and fuelwood) and quantifies the global biomass resources and land availability. Key generic issues related to biomass use and the main conversion processes are set out, in particular with respect to energy crops. Lastly, environmental impacts of using biomass for energy production-primarily reduced greenhouse gas emissions – and the potential role of biomass within a number of global energy scenarios are explored.

The second chapter, '*Delivering the biomass to the conversion plant*', looks at the overall supply chain system of bioenergy. The author first describes different harvesting options and machinery, then reviews common processes for the production of uniform material size and increasing bulk density (comminution) to improve transport and handling and reduce biomass wastage. The chapter, which includes some 25 photographs of different machinery, concludes with three case studies: forest residue in New Zealand; coppice willow crop in the UK; and woody biomass production for community use. The technical aspects and costs associated with each part of the supply chain are presented well (though it should be noted that the cost/benefit balance will likely change over time as technological advances are made, new energy legislation takes affect, or monetary incentives are created for the production or consumption of bioenergy).

Chapter three, '*Heat, power and combined heat and power*', provides a more technical and comprehensive discussion of the principles and efficiency constraints of various biomass combustion systems and power generation systems. The author gives an informative overview of the operation, performance and economics of those

systems, with a primary focus on the systems in use in the USA. The chapter includes a review of chemical and physical properties of the various biomass fuels and chemical analysis tests, and discusses the significance of these properties on the combustion process, emissions and impact on the equipment. The author concludes with a review of performance aspects and the economics of different types of biomass combustion and power generation systems.

The fourth chapter, '*Liquid and gaseous biomass fuels*', presents the processes of anaerobic digestion, gasification, pyrolysis, fermentation, and inter-etherification to produce biodiesel. Some design schematics and photographs illustrate these production systems. The different designs of digesters, gasifiers, and pyrolysis systems are briefly yet clearly described. The authors conclude that anaerobic digestion is a mature technology both at small and medium scales, while gasification and pyrolysis technologies are neither fully mature nor economically competitive for electric power generation at this time, though he points out that this could be changing in the near future. Development of biofuels for transport has been found a proven technology for decades and examples of biofuel production programs in Brazil, the USA, and other countries are given. They also point out, however, that biofuel will only become commercially viable and competitive with traditional fuels with government subsidies or fuel tax exemptions, or if additional values are placed on the resulting environmental benefits.

Chapter five, '*Policy options and strategies for market development of biomass: An Asian-Pacific perspective*', examines trends, constraints and policy aspects in the development and utilization of biomass in Asia. Country profiles of China, India, the Philippines, Thailand and Vietnam highlight the initiatives, successes and impediments that the governments in these countries experienced with respect to the implementation of national policies for renewable energy development. Arguing against a universal set of recommendations for the diffusion of bioenergy, the author makes a number of broad policy and marketing strategy recommendations that must be tailored to national, regional or local conditions.

The concluding chapter, '*Biomass: The fuel of the rural poor in developing countries*', nicely complements the first chapter. It has a broader scope than the three previous chapters. A variety of topics are discussed, some of which were discussed earlier in more detail in previous chapters. However, the emphasis is particularly on fuelwood and the extent to which fuelwood and other types of biomass have been used successfully to supply energy and electricity in developing countries around the globe.

Overall, this a well-written book that covers a useful range of perspectives on the technological and policy aspects of bioenergy with a worldwide scope. It can serve as introductory text, but it is also well suited for scientists who are already familiar with this subject and want to update their knowledge of bioenergy. This book provides a good basic understanding of the differences in the adoption of bioenergy across the globe, the constraints that underlie the development and utilization of biomass, and the need for further technological improvements. The 'cleaner environment' in the title seems to merely reflect that biomass is typically thought of as an environmental friendly alternative to fossil fuel. However, the book provides no specific, quantitative information about the potential impact of increased bioenergy use on the $CO_2$ concentration in the atmosphere, the ozone layer, or carbon trading markets. The material in

this book seems well up-to-date, with many useful tabular data and graphs, and about 200 references in the chapters combined. The price of the book seems fair.

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**Land quality, agricultural productivity, and food security: biophysical processes and economic choices at local, regional, and global levels, K. Wiebe, Edgar Elgar Publishing, Cheltenham, UK/Northhampton, MA, USA, 2003, 480 pp. Price US$ 150 (hardback). ISBN 1-84064-752-3**

This book comprises a collection of integrated studies that contribute to an improved understanding of the entire chain from land quality, land degradation, agricultural productivity to food security and its inter linkages. Both economic choices and biophysical processes are considered. It is a result of a four-year research programme conducted by researchers of a large variety of disciplines and institutions. The 34 authors and co-authors have written 20 chapters and the editor has achieved the remarkable objective to produce a book that is easy to read.

The book contains five parts. Part one provides an overview on the general topic, estimates the current status and presents land quality indicators from the perspectives of soil science and economics. Part two shows relations between land quality and agricultural productivity using production function, total factor productivity and distance function approaches based on spatial explicit (per country) data. Part three examines changes in agricultural productivity over time resulting from land degradation, in particular soil erosion. Farmer's responses to land degradation and adoption of conservation practices in relation to land tenure are modelled. The last chapter in this part presents an econometric model dealing with the relation between transitory and persistent poverty and land degradation. Part four assesses the implications of degrading land, depletion of water resources and loss of productivity for food security. The final part discusses the challenges that lay ahead in research and development and in policy making.

This book provides an excellent overview of the state-of-the-art of our knowledge on relations between land quality, agricultural productivity and food security at the higher scales. It provides a welcomed reference for graduate and undergraduate students in agriculture. In addition, scientists not too familiar with this field of research,