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BOOK REVIEW

Classic papers in natural resource economics revisited, edited by Chennat Gopalakrishnan, London and New York, Routledge Books, 2016, 404 pp., US$170 (Hardback), ISBN 13: 978-1-138-90579-5; Routledge Books, 2017, 424 pp., US$45.95 (Paperback) ISBN-13:978-1-138-50245-1

This book is an excellent compendium of classic papers in the field of natural resource economics, spanning the period 1930 to 2015, along with original papers by scholars in the field commenting on the classics. The book has five parts and includes seven classic papers, each of which is a chapter in the book. The classic papers consist of key contributions from Arrow, Lind, Coase, Hardin, Ostrom, Nordhaus, Solow and Samuelson (six of whom are Nobel Laureates) in the areas of resource production, pricing, consumption, planning, management and policy. Furthermore, 71 scholars drawn from 11 countries with diverse disciplinary backgrounds have contributed 48 other chapters. Their contributions are *original* and their articles were commissioned specifically to examine and analyze the impact of the classics on the discipline. In his introduction to the volume, Gopalakrishnan provides relevant background information, followed by a concise synthesis of the key ideas and concepts from each classic paper.

Part 1 of the book examines the core area of the intertemporal problem. Chapter 1, 'Uncertainty and the Evaluation of Public Investment Decisions', by Kenneth Arrow and Robert Lind (1970), relates to the incorporation of risk and uncertainty in public investment decisions. According to them, a risk-free discount rate, instead of market rates, should be used for public projects whose benefits are widely shared. This can be justified on the basis that risk pooling across a large number of beneficiaries/stakeholders would tend to make it lower. Ten other chapters (Chapters 2 through 11) in this section evaluate the developments that have occurred since, drawing on perspectives from economics, public policy and the social sciences, and probe and assess the paper's impact on public investment decisions.

Part 2 of the book explores the core area of 'externalities and market failure'. Chapter 12, 'The Problem of Social Costs' by Ronald Coase (1960), opens this part of the book. A principal point made by Coase is that efficient resource allocation in the presence of externalities will emerge from voluntary negotiated agreements without market intervention or government regulation. Papers in Chapters 13 through 17 examine the impact and implications of the Coase paper for natural resource economics. They provide learned discourse regarding the controversies and transformative power of the paper and its distortions in interpretations, and assess its successes and failures.

Part 3, 'Property Rights, Institutions, and Public Choice', includes the contributions of Garrett Hardin, a biologist, and Elinor Ostrom, a political economist. Hardin's 1968 paper, 'The Tragedy of the Commons', examined the perils of common property ownership, such as resource degradation, congestion externalities, environmental pollution and rent dissipation. Six other chapters (Chapters 19 through 24) take a critical look at his essay and point to some limitations of his acknowledgedly brilliant contribution.

Ostrom's (2000) paper, 'Collective Action and the Evolution of Social Norms', is included as Chapter 25. She critically examines Mancur Olson's provocative assertion (from 1965) that no self-interested person would contribute to the production of a public good. Olson disagreed

that groups would form and take collective action whenever the members would jointly benefit. Her analysis of crucial social norms such as trust, fairness and reciprocity indicates their importance in the growth and sustainability of collective action. In the seven original papers that follow in Chapters 26 through 32, scholars propound and provide their views on collective action, social norms and crossing boundaries and the use of these concepts in conflict resolution.

The core area of 'The Economics of Exhaustible Resources,' is the focus of Part 4. It includes major contributions from William Nordhaus and Robert M. Solow pertaining to the determination of an optimal depletion rate of exhaustible natural resources such as oil, natural gas, minerals and groundwater. The supply of these resources is finite and cannot be augmented within a reasonable time frame.

William Nordhaus's 1973 paper, 'The Allocation of Energy Resources', is Chapter 33 in the book. The article reports on his investigation to find the efficient allocation of energy resources over time in the cheapest possible manner that would meet a growth path of final demands for energy products. The eight papers in Chapters 34 through 41 examine and analyze the Nordhaus paper from multiple perspectives, taking into account energy conservation, climate change and other changes in the very long run.

Robert M. Solow's 1973 paper, 'The Economics of Resources or the Resources of Economics', is Chapter 42. The paper points out that the Hotelling rule, although a fundamental principle of natural resource economics, is only a necessary condition for efficiency and therefore for social optimality. The Hotelling rule defines the net price path as a function of time while maximizing economic rent in the time of fully extracting a non-renewable natural resource. An important contribution of the paper is the notion of sustainable consumption. The six papers in Chapters 43 through 48 extol, reflect on and celebrate Solow's article in this section.

Part 5 of the book explores 'The Economics of Renewable Resources'. A renewable resource is a central component of the natural resource base that can be replaced or replenished within the same period as its supply is exhausted. The classic examples of renewable resources are forestry and fisheries. Other examples include solar, wind and wave energy resources. Chapter 49 is Paul Samuelson's 1976 paper, 'Economics of Forestry in an Evolving Society'. In this paper, he re-examines the forester's concept of maximum sustainable yield and follows the optimum rotation approach first used by Faustmann in 1849. He formulates a new model that incorporates economic variables, some previously neglected, such as time, interest rate, propensity to save, labour, wage, output price, land rent and the growth function of the forest. Thus his economic analysis leads to a shorter optimum rotation period than the maximum sustainable yield in other theoretical models. Chapters 50 through 55 in this section offer comments and insights on Samuelson's contribution.

Water resource professionals will stand to benefit immensely in their work by understanding the genesis of many concepts they work with every day by perusing this book. Water professionals around the world are applying, advancing and refining the economic knowledge discussed in this book in many ways.

Key contributions of the book include additions to the economic literature on natural resources through 48 original papers written by carefully chosen experts in the field, who provide clear and comprehensive perspectives on various topics. These experts have multidisciplinary backgrounds in economics, political science, sociology, law and more. The book leads the reader to the frontiers of the discipline today without being overly quantitative or mathematical. Both exhaustible and renewable resources receive fair and balanced treatment. Readers are enabled to glean valuable information and draw lessons from examples and applications used by the authors. There is ample discussion of

resource reserves, production, costs, pricing, substitution possibilities, externalities, discounting techniques, permitting, taxes and subsidies, whose understanding could improve policy making.

In summary, Gopalakrishnan's book has unique strengths. It includes seven chapters comprising seminal papers that offer significant contributions to the five core areas of natural resource economics. These papers have literally shaped the discipline of natural resource economics. Another unique contribution of the book is the 48 original papers commissioned by the editor to assess the impact of the classics on the field and to discuss the contribution each paper makes to the profession. The book is thus an ultimate go-to volume for information and guidance for policy makers in natural resource economics. It is also a singularly useful book for researchers and scholars of natural resource economics to explore the key concepts and their evolution. Finally, for students of natural resource economics, the book provides one of the best introductions to the classic papers in the field, as explained by leading scholars. They also get a sense of the intellectual history of the discipline over a period of 85 years. Gopalakrishnan is to be commended for undertaking this monumental work and a job well done. The book is a treasure trove of immeasurable wisdom.

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