The book is divided into three major parts. Part I is unique in that it looks at the demands placed on the forest by an ever-increasing population and how our ability to modify (sometimes to dangerous extremes) and manage the forest has evolved along with the development of humankind. Many will find the first chapter of Part I somewhat esoteric; however, the second chapter is worth reading to gain a better perspective on the interrelationship of man and the forest and how man can continue to impact, or choose to coexist, with the forest.

Part II of the book is divided into five sections: ecosystem function, genetic and evolutionary aspects of ecosystems, physical factors, biotic factors, and ecosystem changes. In these sections various ecological concepts, as they interact with both biotic and abiotic factors, are introduced and discussed within the ecosystem context. The author has done an excellent job of drawing key illustrations from the literature and has used a variety of examples from many sources, thus avoiding the regional biases found in many of today's books.

Part III of the book, which addresses the application of ecological insight to forest management, contains three good chapters dealing with classification systems, the application of mathematical models, and the philosophy of resource management in the ecosystem context. Since the use of mathematical models has become an established and growing part of forest management, the inclusion of this chapter was definitely indicated. In this reviewer's opinion, Part III should have included more discussion of model applications including selected case studies. While this topic could be the subject of a book in itself, the student would certainly benefit from a chapter with more depth in model application and interpretation in the management context.

In summary, this is a well-written text with a good mix of science and philosophy that should be suitable for use by both beginning and advanced students. The quality of the photographs and figures is excellent, and the organization of the book is logical and systematic. The book achieves the author's objective of providing the reader with an insight into ecosystem ecology in the forest management context and additionally provides a framework from which ecological concepts can be applied to day-to-day forest management activities.

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Biotechnological Advances in Processing Municipal Wastes for Fuels and Chemicals


In 1984 a symposium was held in Minneapolis, MN, to assess the state of our knowledge in the area of bioconversion of municipal waste to fuels and other valuable chemicals. This book reports the proceedings of that symposium, which included a broad range of presentations by experts in the microbiology of biomethanogenesis and the technology of municipal waste bioconversion. A.A. Antonopoulos of Agronne National Laboratory served as symposium chair and editor of the proceedings and has done an excellent job of organizing a wealth of diverse information into a useful reference volume. The text is generally well-written and is supported by numerous formulae, tables, and figures. The authors of each chapter have included a brief bibliography and the editor has provided an adequate index.

The first chapter contains an informative and entertaining history of the science of biomethanogenesis by R.E. Hungate, and is followed by 13 chapters that focus on recent research developments in the physiology, biochemistry, and genetics of microorganisms involved in methanogenesis. Chapters 15 to 25 discuss recent developments in the production of gaseous fuels by anaerobic digestion of various feedstocks. Topics range from the nutritional requirements for effective anaerobic digestion to an update of RefCOM, a project initiated by the U.S. Department of Energy to demonstrate bioconversion of urban refuse to fuel. Chapters 26 to 28 present strategies for bioconversion of solid wastes and sludge to ethanol and other valuable chemicals, and the last four chapters (chapters 29 to 32) discuss the generation of gas in landfills and the feasibility of schemes to extract the vast quantity of methane produced in landfills for use as fuel.

The book is recommended to researchers, engineers, policy makers, entrepreneurs, and others interested in the development of technologies that offset the increasing costs of municipal waste management by employing bioconversion of waste materials to generate fuels and other useful products.—GARY A. BREITENBECK, Agronomy Department, Louisiana State University, Baton Rouge, LA 70803.

Lead, Mercury, Cadmium and Arsenic in the Environment

Edited by T.C. Hutchinson and K.M. Meema, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158. 360 p. $94.95.

This volume is the proceedings of a special workshop organized by the International Council of Scientific Unions (ICSU's) Scientific Committee on Problems of the Environment (SCOPE) subcommittee on metals cycling, which in turn is a subcommittee of the overall SCOPE Biogeochemical Cycling Committee, held in Toronto, Canada, in September 1984.

The proceedings include the "Working Group" reports (Part I) plus the individual papers presented (Part II). There were separate "Working Groups" on lead, cadmium, mercury, and arsenic—elements long recognized as significant environmental pollutants on a worldwide basis. Members of the groups are of international renown and acknowledged as some of the "big guns" in a particular element. Each group was charged with the overall assessment of the state-of-the-art for an element with emphasis on future perspectives. Assessments had a global scope that also included developing countries with the hope that they may learn from the mistakes and knowhow of the developed countries.

Gaps in our knowledge of these elements were especially identified. For example, regional and global fluxes of these elements and, therefore, the need to construct cycling models were underlined. Overall, the groups addressed the biogeochemical behavior in atmospheric, terrestrial and aquatic systems, residence times, and environmental/ecological and (human) health aspects of these elements. Among other items discussed...