
Agroecosystem sustainability is as much a process as it is a goal. This book is an innovative attempt to integrate both aspects of sustainability, and at the same time, challenge the reader to participate in creating a paradigm shift. So much of the current literature in sustainability analysis is focused on the development of indicators of success, as if models can be developed, key indicators identified, and progress towards sustainability achieved. But Giampietro reminds us that agroecosystems are complex, dynamic, evolving, and unpredictable, and therefore require a paradigm shift away from reductionist thinking to multi-criteria holism.

This book is a recent contribution to the useful CRC Press series Advances in Agroecology and adds greatly to the diversity of the growing collection. Like many of the other books in the series, the book is not aimed at providing a framework for defining what “more” sustainable means for a particular social and ecological context. The author stresses this point because there will always be legitimate contrasting views of what constitutes an “improvement,” and changes always have unknown implications. Also, what is optimal in a given time and place will constantly change. For these reasons, optimizing models are extremely limited.

Furthermore, reductionist approaches require reducing wholes into parts and then measuring parts to characterize the whole. As a result, much scientific analysis represents a shared perception about reality, not actual reality, and models are simplified representations of such a shared perception. However, sustainability analysis needs to be able to deal with chicken-egg paradoxes—when the identity of the parts determines the identity of the whole, and likewise, the identity of the whole determines the identity of the parts. The author puts his considerable expertise as a leader in agroecosystem analysis towards a similar paradox in sustainability analysis by trying to answer three questions.

1. What role should scientists play in the development of the analysis of sustainability of agriculture that can be more useful for governance?
2. Can we develop different scientific analyses using complex system thinking?
3. What alternative analytical tool kits can be developed for integrated analysis of agroecosystems?

The book is divided into three parts. Part one is an in-depth exploration of the epistemological roots of complex systems analysis, the many ways we perceive reality, and of operationalizing sustainability analysis in systems. The language of sustainability analysis is complex, and it is a daunting, yet necessary, task to work through this section. But the second rewards this effort, by then giving the reader Giampietro’s way of dealing with complexity in systems. Concepts such as multi-scale mosaic effective loop analysis stretch the imagination, time open the door to new opportunities for both social and ecological components while “surfing” the time. Finally, if the reader has survived the first two sections, the final section of the book is a range of case studies and applications of the analytic framework. This section is really a look at complex system thinking in action and forms the heart of MSIA—multi-scale integrated analysis of agroecosystems. Through the multiple pathways of bridging disciplines across hierarchical levels, bridging changes in agroecosystem thinking to the impact generated on the ecological context of agriculture, and the use of benchmarking and tailoring MSIA for work across multiple levels.

This book will be most useful for the advanced reader with experience in agroecology and food system sustainability. It offers a desire to explore new considerations in the field of “sustainability science.” It will be less useful for those not willing to challenge their own academic frames, or able to question current paradigms in dealing with complexity and uncertainty. This is especially true for those of us who work at the interface between ecological and economic frames, or able to question current paradigms in dealing with complexity and uncertainty. This is especially true for those of us who work at the interface between ecological and economic analysis.

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