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## The Science of Open Spaces: Theory and Practice for Conserving Large Complex Systems

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***The Science of Open Spaces: Theory and Practice for Conserving Large Complex Systems*** by Charles G. Curtin (Island Press; 264 pages; 2015)

*The Science of Open Spaces*, by Charles G. Curtin, challenges the traditional conservation paradigm and proposes a science and practice of open spaces which is flexible, locally connected, and interdisciplinary. In this critique, Curtin takes aim at reductionist science and top down control, which he identifies as fundamental aspects of traditional Western scholarship and conservation efforts. In their place, Curtin argues for a theory and practice of conservation based on complex, systems science and integrated, collaborative institutional design. This proposed science of open spaces relies on interdisciplinary, continually refined science and a respect towards the opinions and knowledge of local communities.

In order to clarify the more theoretical aspects of the book, and tie them to real world examples, Curtin relies on several case studies from local, regional, and transboundary perspectives. The first half of the book is split into chapters based on each case study, including the Malpai Borderlands Group, a collaboration between scientists, conservationists, and ranchers in Western New Mexico and Eastern Arizona, the coastal lobster and cod fisheries of Maine, and the Maasai of Eastern Africa. Each of these case studies allows Curtin to illustrate the outcomes of different approaches to management, science, and institutional design. Curtin compares the social dynamics, ecological factors, and institutional players of each case study and discusses how these factors have shaped the history of resource management in each area.

These chapters contain specific examples based on Curtin's personal experiences and involvement at varying levels in each case study. In particular, the chapter on the Malpai Borderlands Group contains an engaging history of conservation in the rangelands of the Southwest United States and detailed descriptions of research at places such as McKinney Flats. This personal experience allows Curtin to introduce the reader to the key players and organizations involved in each case study, as well as offer the reader an account of the successes and failures of the conservation and management efforts in these diverse and complex places.

One of the greatest strengths of the book is Curtin's ability to make a variety of complex scientific theories approachable and understandable for readers without prior knowledge of these disciplines. In order to make his larger argument, Curtin references physics, biology, ecology, systems thinking, conservation and natural resource management theory, cognitive science, and more.

The second half of the book operates as a sort of series of primers in these areas, laying down the necessary baseline information needed to grasp what Curtin calls the "first principles." Many times Curtin will go back to the beginning of a discipline in order to track its changes over the years leading to the concepts and theories fundamental to the science of open spaces. As an example, Curtin briefly discusses the underpinnings of reductionism in Western science so that those without a background in science can more firmly grasp the shift that was chaos theory—which is itself necessary to understand his discussions of complexity and resilience.

However, as a reader with limited exposure to the many scientists and theorists mentioned in this section of the book, it was occasionally easy to lose track of the bigger picture. Although Curtin manages to distill each of the many theories

and disciplines to the bare essentials and make them easily accessible to a novice, there are a few points in the later chapters when it became harder to tie each theory back to practical application in conservation. This was especially true as the chain of theories grew, with one theory being summarized by three or four major points, one of which required a new theory to fully make sense in context. This isn't to say, though, that these sections of the book were dry or confusing. Quite to the contrary, Curtin is able to describe concepts as diverse as trophic collapse and the Santiago theory of cognition in a knowledgeable and engaging way. In this regard, it is no surprise that this book grew out of Curtin's experience teaching a course on this subject and his subsequent need for a single resource covering the necessary science and theory. This section neatly illustrates that Curtin takes the idea of conservation as an interdisciplinary effort quite seriously in his own scholarship.

Although it may have made sense to begin the book with the first principles necessary for the science of open spaces and then build on those principles with the case studies, the way that Curtin has organized his book allows him to easily reference practical realities from examples that the reader has already seen. For example, because the reader is introduced to the use and effects of prescribed burning in the research and conservation work of the Malpai Borderlands Group in the first half of the book, Curtin is able to quickly reference it in later discussions of adaptive management or the importance of proper perspective in scientific research. Because the case studies involve colorful stories, familiar character types, and occasional humor, placing them at the beginning also means that the book begins with a strong, relatable hook.

Overall, through both the case studies and the discussion of the first principles, Curtin lays out a complete theory of conservation that challenges some of the most fundamental assumptions of traditional natural resource management. *The Science of Open Spaces* offers an important critique of traditional and contemporary management practices that anyone involved in conservation would be wise to pay attention to and presents it in a way which is engaging and thoroughly enjoyable to a reader with even a passing interest in conservation.

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