Nature's Matrix: Linking Agriculture, Conservation, and Food Sovereignty

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(The Volcanic Ring that Changed the World), and the influence of isolation on biogeographic patterns in chapter 5 (The Bloody Fall of South America and the Last of the Triassic Beak-headed Reptiles). These are all interesting but a bit uneven in terms of scientific accuracy. For example, although chapter 4 is first rate, and includes a vivid and compelling description of the transformation of Antarctica from "liveliness and greenery" to an "icy, barren wasteland" at the end of the Eocene, I take issue with a few of the simplifications about evolution on islands. Writing that rodents get larger on islands because doing so gives them a "more relaxed metabolic rate" is simplistic. With the removal of constraints imposed by mainland predators and competitors, insular organisms evolve to a size that increases their net energy. When large size no longer ameliorates predation pressure, dwarfing may occur.

Similarly, the author's description of the factors underlying Bergmann's rule (the pattern of larger size in cooler habitats) is a bit flat. The fact that even ectotherms demonstrate clear and striking patterns suggests that body size is not due to "the environmental circumstances of the island," but is rather a more general phenomenon. However, even here McCarthy shows his innate skill at making science accessible when he describes differences between ectotherms and endotherms: "Look at a reptile in the wild.… A good guess is that it is feeling too hot or too cold…. [Whereas, if] you look at some small mammal…more than likely it is hungry" (p. 66). This is a wonderful way of expressing the fundamental difference between these taxa.

The last portion of the book is quite eloquent, albeit on vastly divergent topics. Chapter 6 (Enchanted Waters) is generally engrossing and wide ranging although not comprehensive. McCarthy manages to logically intertwine discussion of physical oceanography with intriguing vignettes about the evolution of sonar, the behavior of orcas, the lack of large aquatic mammalian carnivores, and other interesting ecologies. Here again are a few broad oversimplifications. For example: "The ocean environment is considerably more uniform than the continents. This is why marine mammals…only constitute 2.5% of mammalian species…they have not diversified to the same extent as have their continental counterparts" (p. 122). This statement ignores the fact that living in water poses all sorts of physiological challenges that limit the size of truly aquatic mammals to approximately 100 kilograms (kg) or more. (Although the influence of gravity is less, water has about 24 times the heat conductance of air. In practical terms, this means mammals spend more energy maintaining homeostasis.) About 30% of mammals bigger than 100 kg are aquatic, including the largest 20 or so found on Earth. Perhaps this point isn't important to other potential readers, but as someone who thinks about mammalian diversity over time and space, I prefer more rigor.

Chapter 7 (The Battle Over Eden) is one of the most gripping accounts of biogeography. Here, McCarthy provides a provocative synopsis of modern thought about the diversity and biogeography of humans. He tackles directly controversial issues about human biogeography and evolution and does a fine job navigating these sensitive and tricky topics.

The phrase "here be dragons" conjures up visions of adventure, exploration, and danger, although apparently it refers to early efforts to chart biological distributions. The book aims to convey the same spirit of excitement and discovery about the discipline of biogeography. To a large extent, it succeeds. Overall, the text is exceptionally well written—a bit overly poetic in parts, perhaps, but engrossing. It is unfortunately replete with "go-to" statements (e.g., "as we shall see in the next chapter"); these are somewhat jarring to the narrative. The text makes good use of interesting quotes from writings of Darwin and others and brings in vivid and compelling stories.

Here Be Dragons is an exploration of the intersection of two fascinating ideas in biogeography—evolution and plate tectonics—and some of their key figures, discoveries, and implications. It is not comprehensive, nor is it meant to be. Rather, the book serves as an hors d'oeuvre for those who might be interested in the field. As such, it makes quite satisfying and tasty reading.

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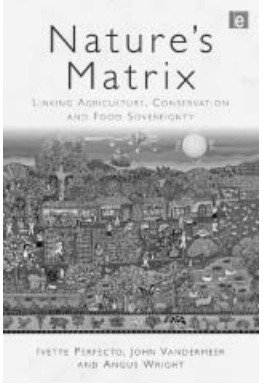
SUSTAINABILITY AND LANDSCAPE MULTIFUNCTIONALITY

Nature's Matrix: Linking Agriculture, Conservation, and Food Sovereignty. Ivette Perfecto, John Vandermeer, Angus Wright. Earthscan, 2009. 272 pp., illus. $34.95 (ISBN 9781844077823 paper).

Food-system sustainability is intricately linked with the quality of the landscapes in which agriculture is imbedded. In this remarkable book, *Nature's Matrix: Linking Agriculture, Conservation, and Food Sovereignty,* the authors describe how linking ecological theory, conservation, and food sovereignty movements can make any landscape's multifunctionality of agricultural components the foundation for sustainable management of the natural and agroecosystem components of that landscape. With an emphasis on multifunctionality, the



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book describes how food production systems can be designed and managed such that they produce food and also provide the multiple environmental services that we expect from natural landscapes (e.g., water production, soil protection, carbon sequestration, biodiversity conservation, etc.).

The two most distinctive (and valuable) concepts presented in the book are (1) migration rates are very likely more important than extinction rates as species move from one "natural" fragment of the landscape mosaic to another, and thus the agroecological conditions of the farmed parts of the mosaic are as important as the protected parts for conservation purposes; and (2) the full potential for linking agroecosystems and natural ecosystems can be realized only with fundamental changes in the nature of agriculture itself. Agroecology must be used to design and manage agriculture in diverse landscapes; this is currently best done by the networks of small farmers and farmer-based social movements that are investing in alternative farming practices, developing alternative market relationships, and striving for self-sufficiency and food sovereignty. Social justice becomes as important an aspect of landscape multifunctionality as biodiversity protection.

The book's coauthors, Ivette Perfecto, John Vandermeer, and Angus Wright, bring together complementary knowledge and experience in building their argument for linking "nature's matrix" with human needs and experience. Perfecto is a professor of natural resources at the University of Michigan and has extensive experience on biodiversity in agricultural landscapes, especially in the tropics, as well as issues related to sustainable development and political ecology. Vandermeer is a professor in ecology and evolutionary biology at the same university, and is one of the world's experts in the ecology of diversity and species interactions, and how such concepts can be used in designing complex cropping systems. Wright is emeritus professor of environmental studies at Cal State University, Sacramento, and a well-known expert in international environmental problems and social justice, especially in food systems. Their book is a unique combination of perspectives that offers the reader a revolutionary way of viewing landscape diversity. It begins with an overview of the concept of the "environmental matrix," and why it is important to view it as a multifunctional space that combines ecological and social values. A clearly presented ecological argument explains why biodiversity matters, yet also addresses that ecological theory and political realities are too often in conflict. The "agricultural matrix" is presented in an historical context as well as described as an element of new social movements focused on linking agroecology and biodiversity. Case studies drawn from the authors' vast field experiences are used to illustrate how landscapes are equally historical artifacts, hot spots of conservation, and centers for grassroots social movements. These include examples from the Brazilian Amazon; world coffee and cacao agroecosystems; and diverse, small-scale food production systems, with a strong emphasis on the tropics.

The integration of ecological, agricultural, and social-movement arguments for the establishment of a new paradigm for managing landscapes is perhaps the most valuable aspect of *Nature's Matrix*. Using what might be called an interdisciplinary approach, the book provides detailed ecological evidence for why diversity matters and how it works in diverse habitats. All chapters are thoroughly referenced and footnoted for those who want to go deeper. The authors present excellent examples that describe how diversity is equally important in all aspects of the landscape mosaic. Since most landscapes are inhabited and altered by humans to varying degrees—and will most likely continue to be and even increase in the future—this kind of agroecosystem design and management can become only more important. Examples of grassroots movements for food sovereignty and self-sufficiency in the book point out how best to ensure that the human footprint will be sustainable rather than destructive, both in ecological and social terms. Rather than looking at what has too often been seen as opposing goals (conservation vs. agriculture), the book offers a path for ensuring protection of vital environmental services while producing food and agricultural products in environmentally and socially just and sustainable ways.

Nature's Matrix is an important attempt to develop a new way of thinking about the roles of conservationists and conservation science in promoting and protecting the multifunctionality of threatened landscapes and the species that occupy them. The book is extremely well written and accessible, with theory and practice balanced throughout. The authors do not shy away from the hard questions about social justice, social change, and political realities in both the conservation and agricultural worlds. Instead, they call for a new paradigm that unites the two. Of course, this requires new thinking on the part of both worlds, but the framework is presented for those willing to explore the new paradigm.

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CAPTURED BY THEIR THREADS

Spider Silk: Evolution and 400 Million Years of Spinning, Waiting, Snagging, and Mating. Leslie Brunetta and Catherine L. Craig. Yale University Press, 2010. 248 pp., illus. $30.00 (ISBN 9780300149227 cloth).

Spider Silk: Evolution and 400 Million Years of Spinning, Waiting, Snagging, and Mating chronographs the evolution of spiders alongside a, if

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