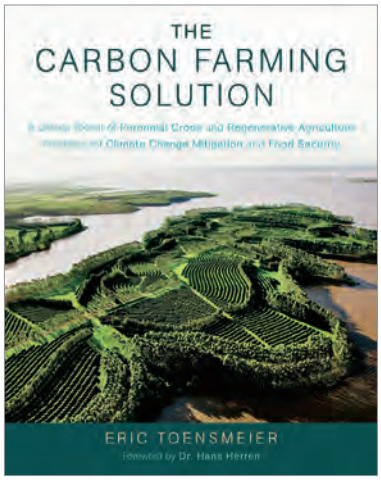
Reviewed by Terry Shistar, PhD

Attacking Climate Change with Agricultural Practices



The Carbon Farming Solution, Eric Toensmeier, Chelsea Green Publishing, 2016

Farmers and researchers have recently discovered the many values of "carbon farming"—farming in a way that removes carbon from the air, where it contributes to climate change, and stores it in the soil, where it benefits soil ecology and crops. Eric Toensmeier, backyard farmer, permaculturist, and climate activist, has created a toolkit for both farmers and activists.

Like the two volumes of *Edible Forest Gardens,* which Mr. Toensmeier co-authored with Dave Jacke, *The Carbon Farming Solution* is a large volume that serves as both a reference and a guide. As a reference, it examines and catalogs recent research about which practices most successfully sequester carbon in the soil. As a guide, it provides information for farmers seeking to adopt carbon farming practices, especially in growing staple and industrial crops.

It is not surprising that the permaculturist Toensmeier concentrates on perennial crops. He presents mountains of evidence showing that perennial crop and livestock systems sequester carbon more effectively than annual cropping systems—which are the basis of industrial-scale agriculture today. He shows first that agriculture is a leading cause of climate change. Then, while considering a reduction in agricultural emissions of carbon dioxide, methane, nitrous oxide, and volatile organic compounds (VOCs), as well as sequestering carbon in the soil, he evaluates the carbon sequestration potential of a number of different agricultural systems. Those systems fit into the categories of woody polycultures, woody crop monocultures, woody biomass monoculture, tree intercropping, herbaceous monocultures, livestock silvopasture, livestock grazing, and annual cropping systems.

Some generalizations emerge—the greatest carbon sequestration potential is in woody polycultures, and the smallest is in annual cropping systems. Within each category, however, studies point to differences, as well as trade-offs between soil carbon and emissions. Although annual cropping systems rank low altogether, regenerative organic agriculture may outstrip some perennial woody systems, especially monocultures. Because of emissions from livestock and manure, an analysis of the impact of livestock systems requires a balancing of emissions and sequestration potential. Some grazing systems are no better than the best regenerative organic annual cropping systems, but when trees are added (silvopasture), the potential for reducing greenhouse gases becomes nearly as high as for woody polycultures.

Mr. Toensmeier told *Living on Earth:* "Productivity per acre is very high and that's great because that allows us to minimize deforestation to clear land for more agriculture. And many would argue that more fertilizer and pesticides would help us do that. My personal approach that I advocate in the book is that there are agro-ecological practices that also intensify, grow more on the same land, without increasing those less environmentally friendly aspects of agriculture as we know it today."

This review offers only an overview of Mr. Toensmeier's encyclopedic treatment of the subject. There are no easy answers, as hinted by the complications mentioned above. What works well in one location may not work well in another. More than half of the body of the book is devoted to information about specific perennial staple and industrial crops. He does not cover in detail perennial fruits, vegetables, or pasture species because they are covered elsewhere—some in Mr. Toensmeier's other books.

While stressing the encyclopedic and detailed nature of this book's treatment of the subject, it should be noted that it is also very readable. Whether you are interested in growing food with minimal negative environmental impacts or saving the world from the impacts of global climate change, *The Carbon Farming Solution* provides an extensive toolkit and thought-provoking reading.

[The author] shows first that agriculture is a leading cause of climate change. Then, while considering a reduction in agricultural emissions of carbon dioxide, methane, nitrous oxide, and volatile organic compounds (VOCs), as well as sequestering carbon in the soil, he evaluates the carbon sequestration potential of a number of different agricultural systems.