

GRASS, SOIL, HOPE

FOREWARD

by Michael Pollan

Hope in a book about the environmental challenges we face in the twenty-first century is an audacious thing to promise, so I'm pleased to report that Courtney White delivers on it. He has written a stirringly hopeful book, and yet it is not the least bit dreamy or abstract. To the contrary, *Grass, Soil, Hope* is deeply rooted in the soil of science and the practical work of farming.

Grass, Soil, Hope is at the same time a challenging book, in that it asks us to reconsider our pessimism about the human engagement with the rest of nature. The bedrock of that pessimism is our assumption that human transactions with nature are necessarily zero-sum: for us to wrest whatever we need or want from nature – food, energy, pleasure – means nature must be diminished. More for us mean less for it. Examples of this trade-off are depressingly easy to find. Yet there are counterexamples that point to a way out of that dismal math, the most bracing of which sit at the heart of this book.

Consider what happens when the sun shines on a green plant rooted in the earth. Using that light as a catalyst, the plant takes atmospheric CO₂, splits off and releases the oxygen, and synthesizes liquid carbon-sugars, basically. Some of these sugars go to feed and build the aerial portions of the plant we can see, but a large percentage of this liquid carbon – somewhere between 20 and 40 percent – travels underground, leaking out of the roots and into the soil. The roots are feeding these sugars to the soil microbes – the bacteria and fungi that inhabit the rhizosphere – in exchange for which those microbes provide various

services to the plant: defense, trace minerals, access to nutrients the roots can't reach on their own. That liquid carbon has now entered the microbial ecosystem, becoming the bodies of bacteria and fungi that will in turn be eaten by other microbes in the soil food web. Now, what had been atmospheric carbon (a problem) has become soil carbon, a solution – and not just to a single problem, but to a great many problems.

Besides taking large amounts of carbon out of the air – tons of it per acre when grasslands are properly managed, according to White – that process at the same time adds to the land's fertility and its capacity to hold water. Which means more and better food for us. There it is: a non-zero-sum transaction.

This process of returning atmospheric carbon to the soil works even better when ruminants are added to the mix. Every time a calf or lamb shears a blade of grass, that plant, seeking to rebalance its “root-shoot ratio,” sheds some of its roots. These are then eaten by the worms, nematodes, and microbes – digested by the soil, in effect, and so added to its bank of carbon. This is how soil is created: from the bottom up.

To seek to return as much carbon to the soil as possible makes good ecological sense, since roughly a third of the carbon now in the atmosphere originally came from there, released by the plow and agriculture's various other assaults, including deforestation (Agriculture as currently practiced contributes about a third of greenhouse gases, more than all of transportation.) For thousands of years we grew food by depleting soil carbon and, in the last hundred or so, the carbon in fossil fuel as well. But now we know how to grow even more food while at the same time returning carbon and fertility and water to the soil. That is what I meant by non-zero-sum, which is really just a fancy term for hope.

It has long been the conventional wisdom of science that it takes eons to create an inch of soil (and but a single season to destroy it). This books brings together the exceptionally good news that this conventional wisdom no longer

holds: with good husbandry, it is possible to create significant amounts of new soil in the course of a single generation. The farmers and scientists who are figuring this out are the heroes of *Grass, Soil, Hope*.

The book takes the form of a travelogue, a journey to the grassy frontiers of agriculture. Some of these frontiers White finds in the unlikeliest of places: on Colin Seis's "pasture cropping" farm in Australia, where annual grains are seeded directly into perennial pastures; on John Wick's cattle ranch in Marin County, California, where a single application of compost has roused the soil microbiota to astonishing feats of productivity and carbon capture; in the tenth-of-an-acre "edible forest" that Eric Toensmeier and Jonathan Bates planted, according to the principles of permaculture, right behind their house in Holyoke, Massachusetts. Each of these chapters constitutes a case study in what is right called "regenerative agriculture." Taken together, they point the way to a radically different future of farming than the one we usually hear about – the one in which, we're told, we must intensify the depredations (and trade-offs) of agriculture in order to feed a growing population. Courtney White's book points to a very different idea of intensification – one that also brings forth more food from the same land but, by making the most of sunlight, grass, and carbon, promises to heal the land at the same time. There just may be a free lunch after all. Prepare to meet some of the visionaries who have mastered the recipe.

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