

## The central challenge for regenerative agriculture advocates: Not undermining the movement by 'overselling' its limited and targeted advantages

The term *regenerative farming* first popped up in the mainstream media in a 1987 [New York Times article](#) about what eventually would be widely referred to as 'organic farming'. But there wasn't an organic certification program to codify the various strains of low input farming that were percolating at the time.

[A]greement on what the movement should be called has not yet been reached. In the East, farmers call the techniques "regenerative," a term coined by scientists and executives at the Rodale Research Center, an influential private institute in Pennsylvania. Farmers in California and the Midwest refer to the practices as "sustainable." The Department of Agriculture calls the system "low-input" farming. And many farmers in the Northeast and Northwest call the practices "organic."

The first three terms are meant to describe farm practices that depend on the dynamic biological interrelationships in nature to achieve the same results as chemical pesticides and fertilizers. The intent is to maintain the purity and availability of renewable resources, like soil and water. If done correctly, advocates say, farmers should also see production costs drop and profits rise.

[su\_panel color="#3A3A3A" border="1px solid #3A3A3A" radius="2" text\_align="left"]**Editor's note: This is part two of a four-part series on regenerative farming. Read the rest of the series:**

- [Part 1 — Regenerative agriculture: The movement dedicated to unseating intensive, 'industrial farming' by claiming it has comprehensive sustainability advantages](#)
- [Part 3 — Viewpoint: Advocates for regenerative agriculture greet questions about its viability 'not with facts or science but with defensive hype'](#)
- [Part 4 — Ideological rigidity is hampering efforts to leverage the regenerative agriculture 'revolution'. Here are two paths forward](#)

The term *organic* ended up carrying the day. Now, however, regenerative farming is having its moment in the sun. As a marketing program, organic has suffered from two challenges lately. The first is that the evidence undercutting organic farming's claim to be better for the environment than its conventional counterparts has piled up and on most metrics, because of the yield penalty for organic farming, conventionally grown food has a smaller footprint per unit of food.

Organic, meanwhile, tends to do a little better on impacts per acre. The justification for the price premium organic fetches has eroded over the last decade as more research pours in. Second, as demand for organic products grew, the modes of production converged with the farming it was meant to be an alternative to. Organic farming is largely carried out as one more form of industrial agriculture. For advocates who were searching for an agriculture on a more human scale, done in a more ecological style, the organic label at the supermarket doesn't necessarily mean as much.

Now, as environmental concerns have shifted from the impacts of pesticide use to climate change, an approach that centers on building soil and brings the potential to sequester substantial amounts of carbon,

regenerative farming is gaining all sorts of attention.

This has led to the inevitable problem of regenerative farming becoming overhyped. Even Civil Eats, a publication generally opposed to industrial agriculture and an advocate for alternative farming, posed the question, [“Does Overselling Regenerative Ag's Climate Benefits Undercut its Potential?”](#) in the wake of a [Rodale Institute report](#) that made this claim extraordinary:

Data from farming and grazing studies show the power of exemplary regenerative systems that, if achieved globally, would drawdown more than 100 percent of current annual CO2 emissions.

The various experts Civil Eats spoke with found the claim preposterous.

1) Overselling regenerative agriculture could be the demise of an otherwise promising movement. Can regen ag reverse climate change? NO. Can it sequester C & do other good things? YES YES YES.

But it is maddening to see such BS around its benefits. <https://t.co/GINDuW9EWU>

— Paige Stanley (@paigestanley\_ag) [October 1, 2020](#)

This [@RodaleInstitute](#) white paper is dangerously incorrect. They misuse data from my own work to say that regen "pasture management" (??) could sequester 114% of all CO2 emissions. Tell that to the arid soils of the Western US. Regionality is a thing. <https://t.co/hafnGJc0Hb>

— Paige Stanley (@paigestanley\_ag) [October 1, 2020](#)

White papers, unlike scientific publications, are not peer-reviewed examinations of new data. “This white paper is not based on a study in which we transform or shift every single [farm] field around the world,” says Rui, which he notes is impossible.

But just how rooted their perspective is in existing facts is in question. And the experts we spoke to had several criticisms of the white paper. First, experts interviewed claimed that Rodale Institute ignored more careful analyses, like [those of Rattan Lal](#), director of Ohio State University’s [Carbon Management and Sequestration Center](#), recent [winner of the World Food Prize](#) and [others](#), which suggest that regenerative agriculture can offset at most 10-15 percent of emissions.

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And, instead of rigorously doing an analysis with real-world data, it appears that the white paper authors simply picked a couple of hand-selected sites and multiplied that by the entire land area on Earth, says says Jon Foley, executive director of [Project Drawdown](#).

“When I tell people that we can offset up to 15 percent [using soil as a carbon sink], they tell me I’m overly optimistic,” says Lal.

## Defining regenerative agriculture

Before trying to rightsize where regenerative farming might fit into sustainable agriculture, we should define what it is.

Definitions differ depending on whom you ask. Regenerative agriculture is strongly associated with reduced tillage — mostly no-till; cover crops and green manures to maintain constant soil cover and naturally provide nitrogen and organic matter; polyculture (diverse rotations and cover crop mixes), and integration of intensively managed livestock.

Not all farms that identify as practicing regenerative have livestock, using the techniques of conservation agriculture (reduced tillage, cover crops, and diverse rotations to build soil health). The current zeitgeist around regenerative farming is, however, mostly driven by the integration of intensively managed grazing where poultry, cattle, sheep, or goats are kept tightly clustered on pasture and moved more frequently on to ungrazed pasture.

Some farmers consider the judicious use of pesticides, especially herbicides, an important part of successful no-till farming. Others see the organic prohibitions on synthetic pesticides and fertilizers as part and parcel to regenerative agriculture.

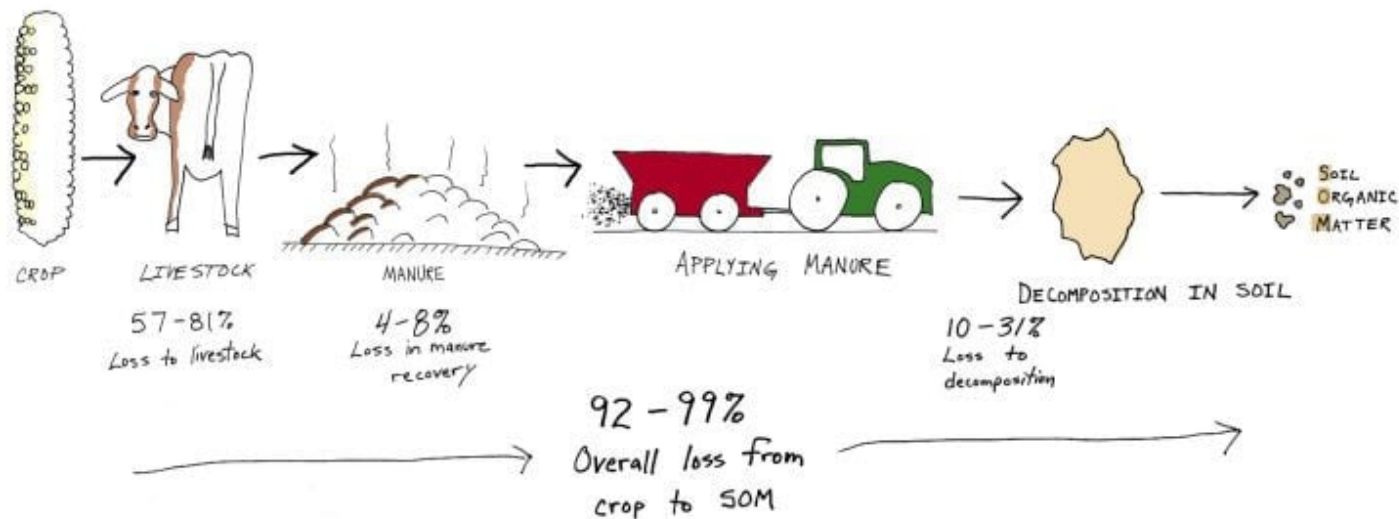
Perhaps we should take the definition as springing from the word itself. The outcome rather than the route is what defines regenerative agriculture. Is the soil regenerating? Then the farm is a regenerative farm. If it is not regenerating, then it is not a regenerative farm.

A central problem in farming becomes a problem for regenerative agriculture in a very specific way. There’s an old saying that “Anything you take off the farm must be replaced”. That is, when you harvest corn or pick watermelons for sale off the farm, you are exporting nutrients off the farm that came from the soil: nitrogen, phosphorus, potassium (NPK), and other micronutrients. Those all need to be replaced somehow or the soil becomes degraded over time and eventually won’t produce (or will , but at uneconomically low yields).

**Farming is regenerative agriculture when *soil* is the product and *food* is the byproduct**

The most serious bottleneck in farming is nitrogen. In considering reforms to the status quo, we always need to be asking two questions:

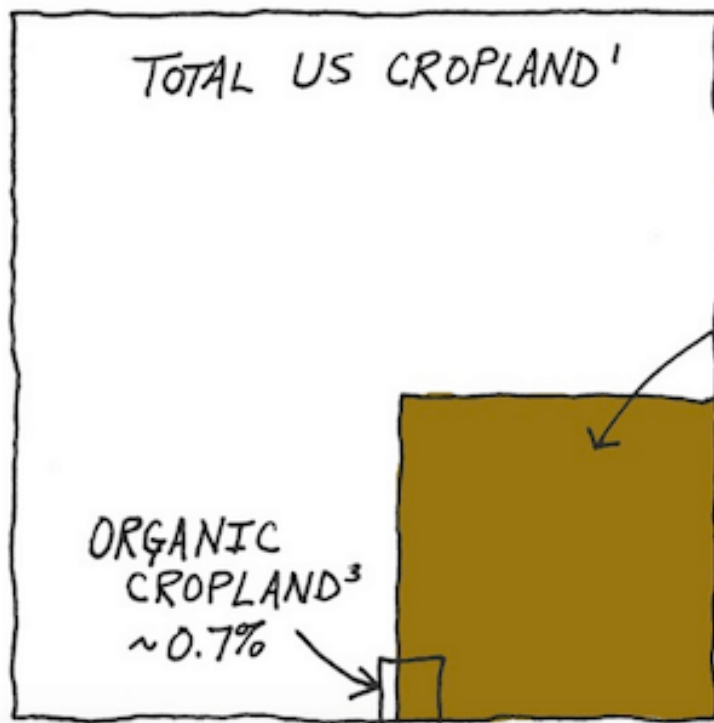
- How much land will this take and where does the nitrogen come from?
- The second doubles back on the first: how can we get nitrogen to replace what's taken off the farm.



Credit: Andrew McGuire/Washington State University

Nitrogen either comes from energy or land + time. It comes either via the Haber-Bosch process that uses prodigious amounts of energy and natural gas to supply hydrogen to render inert atmospheric nitrogen ( $N_2$ ) into reactive ammonia ( $NH_3$ ). Or nitrogen is replaced through growing green manures, nitrogen-fixing plants, in fallow periods. That requires more land than systems that use imported sources. Where does the nitrogen come from? Where does the land come from? Manure can supply nitrogen and phosphorus, but the supply of manure is bounded by biological and physical restraints. Despite the sense that we are drowning in manure from industrial CAFOs, manure for fertilizer is a scarce resource and can never supply more than about 20% of nutrient needs.

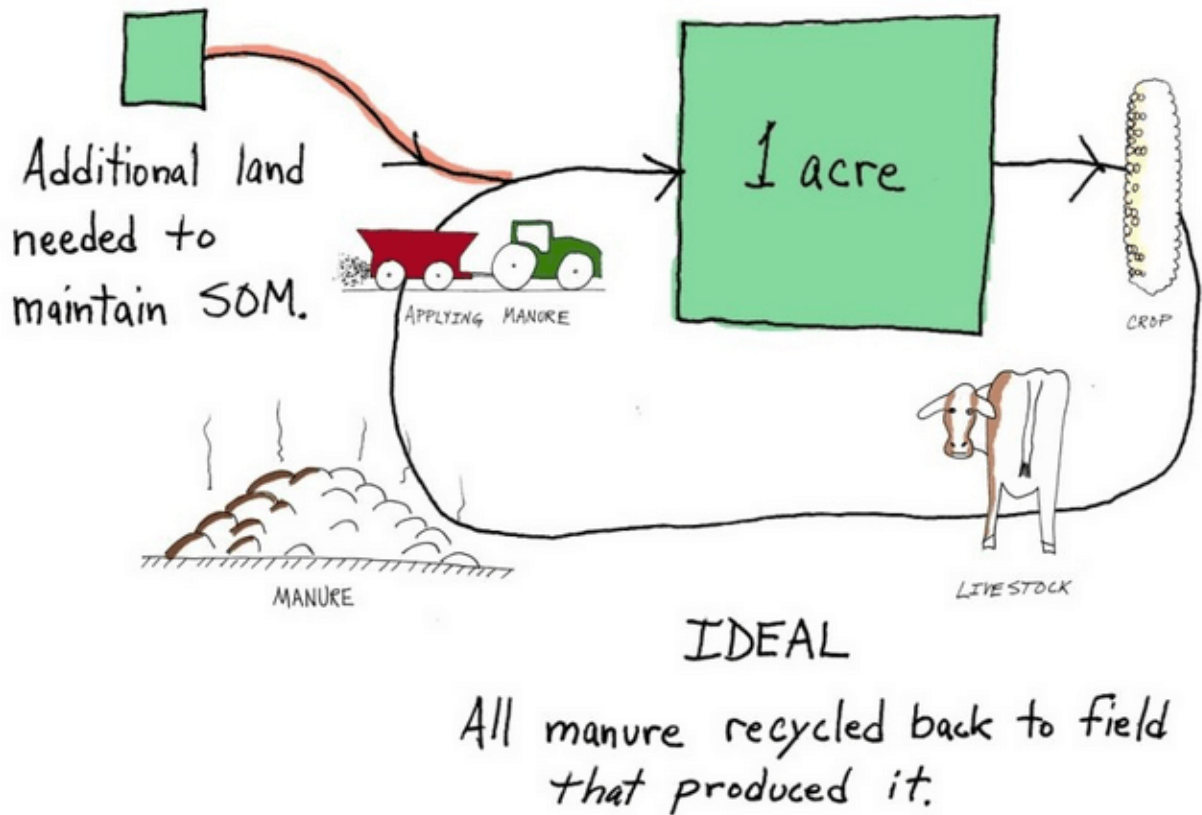
# THERE IS NOT ENOUGH MANURE



AREA OF CROPLAND where SO  
could be maintained with  
available manure<sup>2</sup>  
~20%

Credit: Andrew McGuire/Washington State University

The ancient Romans understood how to slow down soil degradation through crop rotations, using nitrogen-fixing crops, and application of manure. However, in feeding the population of a city, what they couldn't do was fallow large tracts of agriculture land long enough for soil fertility to return. Instead, they expanded their empire ever outward in search of new soil, new sources of nitrogen.



Credit: Andrew McGuire/Washington State University

Regenerative agriculture deals with the problem of nutrient degradation by making food production a byproduct of building soil. We might think about defining regenerative agriculture as *farming when the soil is the product and food is the byproduct*.

The economics of that gets dicey at scale. Getting business to pencil out where the byproducts pay to product is a tricky business. Currently, practitioners of regenerative systems are not selling into commodity markets, they sell a differentiated product into premium niche markets. That works when regenerative farming represents an alternative subculture. It would unravel with greater adoption, as not everybody can sell into premium niche markets. There aren't enough premium niche customers and if there are, they cease to be niche enough to fetch a price premium.

The other problem is land. One of the [first studies to show](#) that intensively managed grazing could, on net, sequester enough carbon to more than offset the greenhouse gases associated with production also found that grass-finished beef required 120% more land—more than double—than that required by feedlot beef.

In the US, the footprint of agriculture has shrunk slightly since the middle of the 20th century, even as the population doubled. We'd like to keep it within current bounds or even shrink it a bit more and restore some marginal lands to wilderness. It's not that big a deal if a few dozen farmers and ranchers adopt regenerative systems to rebuild soil with the tradeoff of producing less food per acre. If it starts becoming as widely adopted as advocates hope, we have to start asking where the land comes from.

These challenges being what they are, it is nevertheless imperative to stop the soil erosion and degradation that causes the loss of 36 billion tons of soil globally. Likewise, it is paramount to minimize greenhouse gas emissions associated with agriculture, particularly beef production which accounts for 30-40% of total agriculture emissions. We need to do more than just cut emissions where we can, we need to sequester carbon wherever the opportunity presents.

Under current economic incentives within the current footprint of food production, we face steep challenges to figure out how to center soil health and carbon sequestration in food production. Over-the-top evangelizing alienates potential allies and invites cynicism when real-world results don't live up to claims.

Perhaps most consequentially, evangelizing makes it nearly impossible for policy and decision makers to think strategically about trade-offs. Instead, it encourages chasing shiny objects and responding to fads. In the next installment in this series, we'll look at two reactions to overblown claims that branch in very different directions and how they can point us to thinking about regenerative agriculture more strategically.

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