

# 1) PATHWAY FOR A JUST TRANSITION to Organic-Regenerative Agriculture in Vermont

Stephen Leslie 5/17/22

2) My wife, Kerry Gawalt, and I began farming in the Upper Valley in 1996. Cedar Mountain Farm is a micro dairy of 20 Jersey cows and a CSA market garden. We are also partners in Cobb Hill Cheese---makers of artisanal raw milk cheeses. Other products include farm-raised beef and finished compost. Our farm is located at Cobb Hill co-housing in Hartland, VT, a 23 household eco-village situated on 275 acres of conserved land and dedicated to sustainable living, forestry and farming.

3) By practicing no-till organic vegetable production & adaptive rotational grazing with elements of silvopasture, we are attempting to mimic the processes of long term stable carbon sequestration and storage endemic to the ancient old growth forests that once covered our region. We see all these practices as comprising a synergy of effects to restore the totality of landscape functions of the farm ecosystem. Experience has shown us that if we focus first on soil health---crop yields and livestock health will follow. We need to build more resilience into our systems now so that we can be part of the climate solution rather than contributing further to the problem. We want to help our region transition to a re-localized sovereign food system and ecological economy. Organic regenerative agriculture is not just about farming---it's about regenerating the entire biosphere.

We Vermonters have before us the opportunity to create a PES program that is both aspirational and inclusive. We can design a program with the long term goal of transitioning land management to organic-regenerative practices. But to be successful such a program must offer a "just transition" where we meet farmers *where they are*. That's why voluntary enrollment is critical and a tiered approach essential for appealing to the widest audience----ensuring the broadest possible on-ramp into the program.

4) Imagine two 60 acre fields in the Champlain Valley. Both fields have been under conventional management and planted to corn year after year for decades. They are sprayed with slurry, receive annual applications of NPK chemical fertilizer, the corn seed is coated with fungicide and Neonics, the field is sprayed with the herbicides glyphosate and Atrazine. When growing corn for silage the maximum volume of biomass is harvested leaving very little stubble. For seven months of the year the ground is exposed. The soils in these fields are degraded and lifeless. They are prone to run-off and wind erosion.

Now imagine for a moment that you can travel back in time 300 years to the same location pre-European settlement---walking into the original old growth forest of the Champlain Valley. Into the cool shade of the towering white oaks and pines that once existed here. The first thing you might notice is that although there are very large trees, there are also trees of every size and age. The canopy structure is multi-level and there are gaps, nothing is neat and tidy, there are snags and lots of deadwood scattered round. Seedlings rise up from the rich humus accumulating on old logs. The forest cover beneath your feet feels soft and spongy. Your steps hardly make a sound. There are greater varieties of wildflowers and understory shrubs than you've ever seen. Liverworts, mosses and lichen top root-rimmed boulders and drape off trunks and limbs. Fronds of ferns grow thick where the shade is deepest. The place teems with wildlife and birdsong. Beavers slow down water and create meadows, salmon and trout brim the frequent brooks and streams.

But all this biomass above ground was dwarfed by the more than 60% of the total *underground*. For all the tons of carbon held in the trunks and branches---the real long term stable carbon was built up over centuries in a substrata of deep humus. Estimated to have had SOM at 9-12%. That is the carbon bank we are still farming on.

Now back to the present--- we see these two mono-cropped 60 acre fields of corn---no matter how good the yields might be---we realize that a once vibrant forest ecosystem has been utterly reduced to an ecological desert---and continues to be degraded

5) Now along comes the state of Vermont offering PES incentives. The two farmers who manage the two 60 acre corn fields (Farmer A & Farmer B), are up-to-speed with a Nutrient Management Plan and RAPS compliance, and choose to sign on to the program. In the first year they both plant a post-harvest cover crop of winter rye---and receive a base pay and credits.

Both fields are managed by one person operating a 150 hp tractor (except at harvest time, when two people are needed---one on the chopper and another towing the silage cart). After costs, the value of the corn silage is about \$625/acre.

The next year farmer A is happy with the cover crop program and continues to grow conventional corn but now keeps the ground protected over winter with the rye.

Farmer B is so impressed with the soil buffering effect of the cover crop, that she decides to enter into tier two of the program. She gathers a team of TSP advisors, administered by the local Conservation District. Using the Soil Health Principles as a metric, they develop plans for a Soil Health Management System. The program guarantees a base income to ensure a smooth transition.

6) Her next step is to try growing no-till corn. Rather than discing in the rye, it is terminated with glyphosate and a no-till drill is used to plant. Rather than spreading slurry a liquid manure injector is used, which reduces the need for nitrogen fertilizer.

At the end of the year farmer B is again impressed and decides to go into tier 3 of the program. A three year crop rotation of corn, soy and small grains (grown for a local bakery) is introduced into the no-till system along with diversified cover crops. Rather than using raw liquid manure, compost is now spread on the field. Perimeter electric fencing is set up so that beef cows can rotationally graze on the crop residue and hardy winter cover crops. The farmer uses a roller-crimper to terminate covers and reduces glyphosate use in her first year by 85%.

7) This is still a one person operation. The diversified revenue stream of beef, soy, wheat & corn improves the farmers' bottom line and allows her to take on a seasonal employee. New equipment has been purchased for sowing and harvesting but old tillage equipment has been sold. Ever since growing corn in rotation, the farmer discovers that pest cycles are disrupted and treated seed is no longer necessary. Row crops are undersown with diversified cover crop mixes that can be mown with an inter-row-crop mower. Nitrogen-fixing legumes begin to replace soluble Nitrogen fertilizer and the return of mychorizal fungi delivers phosphorous and metabolites to the plant rhizosphere. Soil carbon begins to increase.

An established riparian buffer at the edge of the field is planted to native species of shrubs and trees to mitigate flooding and serve as a wildlife habitat and corridor

There is a 10 acre section of the field that is a class 2 wetland. The farmer opts to stop production on 5 acres and to begin a program of wetland restoration. Native plant and shrub species are reintroduced. Wildlife, amphibians, reptiles, ground-nesting birds, waterfowl and insects return to the area. On the remaining 5 acres of wetland solar panels are installed and permanent sod is planted underneath. A neighbor brings their flock of sheep in to graze under the panels 2-3 times over the course of the season.

Another 20 acres of the field are steeper uplands. In tier 5 the farmer establishes permanent cool season grasses and legumes and grazes 20 cow/calf pairs with adaptive management grazing. Shade trees that build soil on the steep grades and bear hard mast; such as hickory, oak & chestnut are introduced into the uplands to create a silvopasture system. 1/3rd of the mast is harvested by a local nut processing cooperative to make flour and to press for oils. The cows are followed in rotation by chicken tractors with a 1000 meat birds and 200 layers.

With the increased labor and revenue streams two more full-time farmers are hired on.

8) In tier 6---3 acres close to the stream and the road are converted into a no-till vegetable operation complete with propagation & season extension tunnels, wash/pack station and farmstand. Nine people are employed in this operation in the growing season and two of them work year round.

The farmers introduce alley cropping with perennial fruit and nut shrubs and trees into the no-till garden and a pollinator hedge separates it from the larger fields. The no-till garden grosses \$100,000/acre. Meanwhile Farmer A is still growing corn silage with a rye cover crop but he has been watching the progress on the other side of the fence and decides to take the leap to no-till. His regenerative journey has begun.

Farmer B feels like she is just getting started. Even in a bad drought year her field holds water and remains productive. When the next door field is inundated with too much rain, her 60 acres are able to infiltrate it all. Next steps include the establishment of a 5 acre food forest and digging a spring fed pond to enhance wildlife and augment irrigation capacity.

Farmer B's 60 acre field may not have the fully restored landscape function of an ancient old growth forest---but it is well on its way to achieving high quality soil health, enhanced biodiversity, meaningful employment and a bounty of nutrient dense food products to feed the local community.

9) 1/4 of all terrestrial life lives in soil. Seven times more carbon is stored in soil than in all the above ground plants and atmosphere. 1/3 of worldwide annual emissions is sequestered in soil. When soil biodiversity is restored, every living being reaps the benefit. By offering incentives and technical assistance the 80% of VT Ag acres currently devoted to dairy can be *justly* transitioned to produce not only dairy but a wide diversity of annual and perennial crops. It's not a matter of getting rid of cows---it's a matter of adding back in everything else. This kind of farming is management-intensive but that can translate into an era of opportunity for future farmers.

But for this to happen we need to elevate healthy soil as the essential ingredient to solving the climate and ecological crisis. An aspirational and inclusive PES program can protect this most precious "public good" by offering transformational incentives for the adoption of Soil Health Management Systems.

*When we engage in land restoration we begin to repair ourselves.*

Farmer B has touched off a spiral of regeneration and repair on her land by farming in a way that produces nutrient-dense crops, increases biodiversity, builds healthy soils, improves water catchment, and enhances nutrient cycling, all with the aim of increasing soil organic matter and microbial life, as well as above ground biomass; thereby helping to reverse the current global trends of atmospheric accumulation of GHGs. Organic-Regenerative agriculture is grounded in a culture of soil care that prioritizes soil health while setting ethical standards for animal welfare and worker fairness in order to create farming systems that work in harmony with nature to improve the quality of life for every living being. Climate scientists the world over have declared that a transition to regenerative land management and habitat restoration must begin now in order to stave off the worst effects of irreversible abrupt climate change. A PES program that incentivizes soil health protection and restoration may be our last best chance to pass on a livable planet to the next generation.

10) Vermont can lead the way!