Curbing Climate Change Through Biodynamic Agriculture
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> *"A truly regenerative agriculture is one in which all the natural resources we use to produce food are renewed in the process of using them."* Fred Kirschenmann

As the certifying agency for Biodynamic farms across the USA, Demeter's vision is to heal the planet through agriculture. That's a bold statement, because the very act of farming worldwide is responsible for at least 15% of global greenhouse gas emissions, the leading cause of climate change. That is more than the transportation industry, and when you add in the distribution of food, from seed to shelf, agriculture is the number one man-made contributor.

The Food and Agriculture Organization (FAO) of the United Nations World Food Day was held on October 16, 2016, and their message is "Climate is changing, Food and agriculture must change, too." The FAO is calling on countries to address food and agriculture in their climate action plans, which were addressed during November 2016 at the annual UN Climate Change Conference, COP 22, held in Marrakech, Morocco.

It is important first to understand how agriculture produces these high emissions. One way is through farming activity itself: ploughing fields releases carbon dioxide from the soil into the air. Industrial livestock operations maintain huge numbers of animals on confined feed lots; the animals are force-fed hay and oats, contrasted with the grasses that these animals would forage if allowed to range freely. This force-feeding results in the emission of large quantities of methane. Conventional farming uses fossil fuels to make fertilizers, and when those fertilizers are applied to soil, they disrupt a plant's ability to process carbon from the atmosphere and build soil. Agriculture also involves land-use changes: mono-crops replace biodiversity; forests are cut down; fragile grasslands turn to desserts. These changes alter the earth's ability to absorb and reflect heat and light.

Fundamentally, too much of the carbon that was stored in the earth's soil has been released through farming, changing it from a solid into a gas. The carbon is joined by methane and nitrous oxide, and the "greenhouse gasses" form a shield between earth's atmosphere and the sun, trapping the sun's heat and warming the planet.

So the question becomes, "How do we both reduce the amount of these greenhouse gasses we are producing, while pulling the carbon that has already been released, back from the atmosphere and into the soil where it belongs?" The answer, ironically, is through farming: regenerative farming. And the best tool we can utilize to help us pull that carbon out of the air is already hard at work all around us, at least while the sun is shining: photosynthesis.

In the process of photosynthesis, light energy from the sun is absorbed from the air by trees and plants, along with carbon dioxide (CO_2). The oxygen is released back into the atmosphere, and the carbon is processed into sugar, transforming it from a gas to a liquid. Some of this liquid carbon is utilized by plant, and the rest flows down into

the root system, where it is released into the soil. After our oceans, soil is the biggest carbon sink on the planet.

Here is where things get really interesting. There is this beautiful symbiosis going on beneath our feet, where the liquid carbon transforms into a solid, and is taken up by the microbiota (bacteria and fungi) that make up healthy soil. In a handful of soil there are more microbes then there are humans on the face of the earth. This microbiota returns the favor, releasing minerals and trace elements that feed the roots, encourage worm activity, and build soil, by creating carbon-rich humus. Building soil humus means the soil can then capture and store more water. The plant-microbial bridge delivers the trace minerals to our food that our bodies need to stay healthy and to ward off disease.

Conversely, the presence of synthetic fertilizers discourages plants from pulling the carbon they need from the air. That beautiful exchange between root and microbes is broken, and the composition of the soil deteriorates. Plowing fields does added damage. When soil loses carbon, it becomes hard and compacted, and its ability to absorb and retain water is dramatically impacted. You can't get nutrient-dense food from nutrient-deficient soil.

This understanding is awakening our scientists, environmentalists, and food advocates to a fundamental truth: we cannot change the projectory of climate change if we don't change the way we farm. The time has come to re-envision agriculture, not as a contributor to climate change, but as one of the remedies for it. The time has come to reimagine farming.

The answer to the future of farming may lie in its past. Demeter passionately believes that the Demeter Biodynamic Farm Standard offers a comprehensive agronomic blueprint for achieving these goals of regenerative agriculture and carbon sequestration. This tried and true standard, first conceived of in the late 1920s as an agricultural method offered as a response to the industrialization of farming, and still to this day promoted through an international collaboration of more than twenty countries, offers coherent principles and easy-to-follow, common sense practices that encourage farmers to be ecologists. Carbon farmers, if you will.

Here's how. The basic concept of Biodynamic agriculture is that the farm should be viewed as a self-sufficient, integrated whole. A living organism. Indeed, even the word "organic" comes from this Biodynamic ideal. In order to create a farm as a closed system, solutions for that farm's vitality (fertility, soil health, disease and pest control) must arise from the farm itself and not be imported from the outside. This self-reliance provides living proof of the concept of regeneration.

Biodynamic farming includes organic certification's prohibitions against the use of synthetic pesticides and fertilizers. But in addition, maintaining that idea of the farm as an integrated whole, the entire farm must be certified (versus a particular crop or field, which is allowed in organic certification). Farmers must devote at least ten per cent of total acreage to wilderness habitat; for example oak groves, waterways, and meadows.

Low tillage (if not no tillage) is encouraged. Integrating livestock, building compost, and utilizing cover crops generate on-farm fertility. Holistically-managed cattle grazing develops perennial grassland. Control of diseases and insects is created naturally through botanical species diversity and predator habitat. Vegetative cover, like legumes, returns nitrogen to the soil. The use of eight Biodynamic preparations made from materials found on the farm enhances soil, compost, and the very act of photosynthesis. All of these practices result in and depend on healthy and vibrant soil; carbon sequestering soil.

Demeter remains the oldest ecological certification organization in the world. Its farm standard has always been a regenerative agriculture standard, and Biodynamic farms have been sequestering carbon for nearly 100 years. But we want to do more.

Starting in January 2017, Demeter certification is going to include soil testing fro carbon sequestration. When an inspector visits a farm during its annual renewal process, soil samples will be collected and sent to a lab for testing. This will provide a valuable tool to measure progress that a farmer is making in building biologically active soil, and will allow Demeter to further assist farmers on their path of continual improvement. Aggregating this data will give voice to power about the impacts of this regenerative farming system, in our quest to help people reimagine farming. In doing so, we join with the FAO, food advocates, savvy consumers, and regenerative farmers around the world in pursuing our vision of helping to heal our planet through agriculture.
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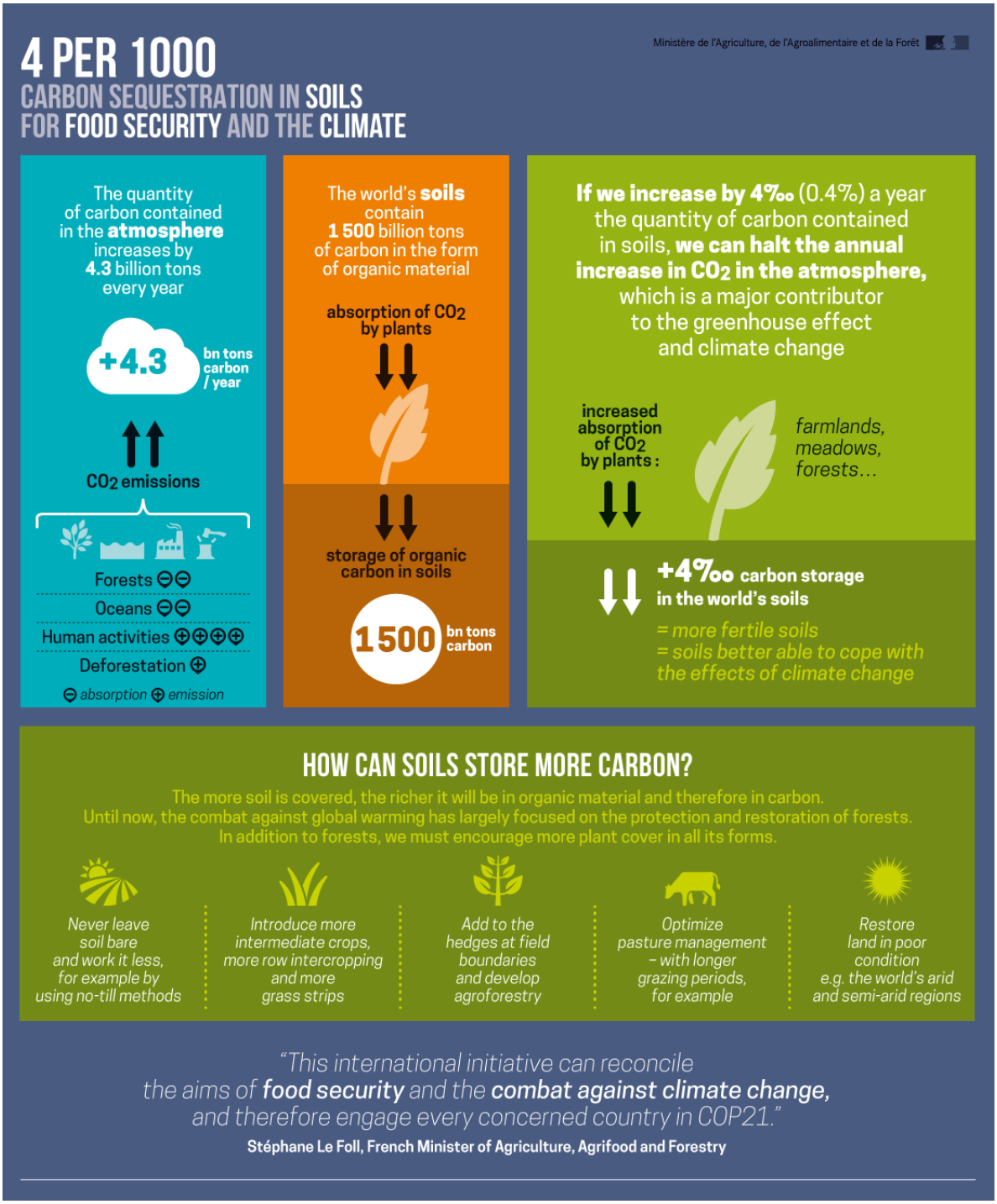
Also part of the article:

What is Demeter Certification? In 1927, following Steiner's lectures on agriculture, a co-operative was formed to market Biodynamic produce, and in 1928 the Demeter symbol and first Standards were introduced to ensure that the farming methods were uniformly followed and monitored.

Demter USA is the certifying body for Biodynamic farms cross the USA. In 1985 Demeter was formed in the US as a non-profit organization, 17 years before the USDA established the National Organic Program (NOP).

Demeter International is the first and remains the only ecological association consisting of a network of individual certification organizations in 45 countries around the world.

And the graphic below:



Graphic courtesy of *4 Pour 1000*, a French based NGO that brings together public and private sector parties who are committed to supporting and/or implementing farming practices that maintain or enhance soil carbon stock on as many agricultural soils as possible and to preserve carbon-rich soils.

And what does *4 Pour 1000* mean? Professor Chris Rhodes described it clearly: "The total amount of carbon stored in soils is reckoned at 2,400 billion tonnes, making it the largest terrestrial carbon pool. The total carbon emissions by humans amounts to an annual 8.9 billion tonnes, and so the ration 8.9/2,400 - .4% which is where the "4/1000" figure comes from." (Energy Balance, December 14, 2015) A 4% annual growth rate of the soil carbon stock would make it possible to stop the present increase in atmostpheric CO2.

** Lilipoh stands for Lilfe, Liberty and the Pursuit of Happiness. Life can mean the quality of life, inner life, consciousness, in other words living a life enhanced through understanding. Liberty may mean the freedom to choose how one lives. Pursuit of happiness is a high term which has often been used superficially. It can mean the joy of helping each other along the road of inner and outer health and towards a better world.*