

Team: Green Tec Mty
Username: greentecmty
Email: alanmata99.11@gmail.com
School: Tec de Monterrey Campus Monterrey

Greener Challenge Soil Sustainability

Agriculture - Carbon Farming Lesson Plan – What to cover/brief summary

For years, scientists have argued that human civilization must prevent the planet's average annual temperature from rising by more than 2 degrees Celsius – or face certain catastrophe. According to the Intergovernmental Panel on Climate Change, once we pass that critical threshold, life on Earth is going to get more difficult. Droughts, floods, superstorms, food shortages and widespread extinctions are predicted.

But, what can we do to delay this?

Unfortunately, we will hit the two-degree mark by the end of the century. Even if we cut out carbon emissions drastically, it will be too late. However, there is one thing we can do to avoid the worst catastrophes; we need to find a way to suck the excess greenhouse gases out of the atmosphere.

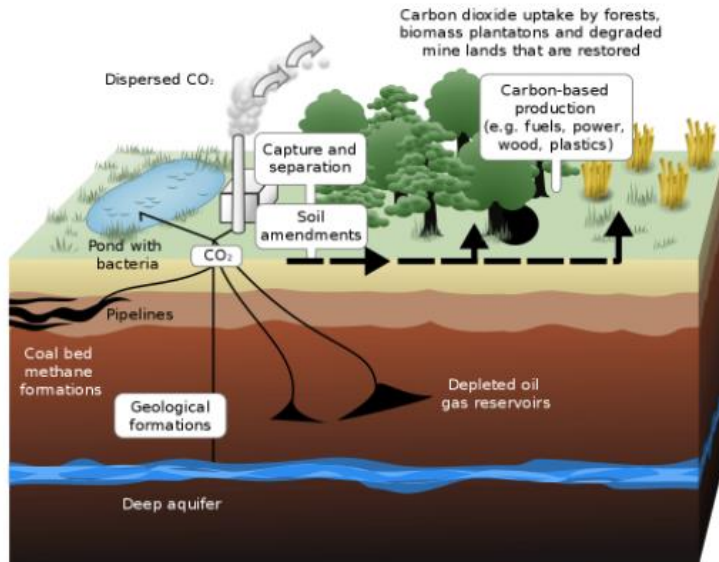
How can we do this?

A Bill Gates-backed startup, for example, is experimenting with a factory-liked facility that pump CO₂ out of the air, creating carbon pellets that can be buried underground or used for fuel. There is a better, time-honored, low-tech solution though, it's called **carbon farming**. It means to use farms not only to grow food, but also to sequester carbon safely in the soil.

Agriculture is a major contributor to global climate change, since the industry drives deforestation, relies heavily on fossil fuel-powered machinery, and raises methane-emitting livestock by the billions. However, it has the potential to be a big part of the solution. We can reduce or eliminate our food system's chemical dependency, which will lower GHG emissions, rebuild healthy soils and fertility, and restore watersheds, among other benefits. A great solution is carbon sequestration.

How does carbon sequestration work? (show picture)

Well, it is a well-known fact that plants absorb atmospheric carbon dioxide through photosynthesis, releasing oxygen in exchange. As crops grow, carbon is used to build plant tissues both above and below ground. Sequestering more carbon by planting more trees *is readily recognized* as a strategy for fighting climate change. But what happens underground is just as important: Plant materials that are left to accumulate and slowly decompose in the soil contribute to the formation of soil organic matter, a way of storing carbon in the soil over long periods of time. We could say that carbon farming is a new perspective on an old idea.



LeJean Hardin and Jamie Payne

Carbon sequestration

Soils high in organic matter tend to be good soils: They are more resistant to drought, less prone to erosion, harbor more beneficial soil organisms, and are generally better at growing healthy crops with fewer synthetic inputs. However, soil organic matter is also about 58% carbon, which is why the business of building and protecting organic matter in soils is so important.

Soils are the second-largest pool of carbon, after the oceans. They hold more carbon than the atmosphere and all vegetation combined. They aren't necessarily climate neutral, depending on how they're managed: they can release additional carbon into the atmosphere through practices like overgrazing and excessive plowing, or soak up atmospheric carbon through practices like agroforestry and conservation agriculture. *But* when run properly, farms can be powerful tools in the fight against climate change.

So, if soil farming is good and simple, why isn't it being widely implemented?

Well, while public awareness campaigns like **Soil Solutions** or **Kiss the Ground** are eloquent in presenting the overall argument, the success of carbon farming comes down to what happens at the farm level, on hundreds of millions of farms all over the world. There are many factors that need to be taken into consideration. Encouraging farmers to implement the right kinds of practices—and providing them with accurate information as to what those practices are—is a multi-faceted challenge, the contours of which depend on the type of farm, the soil type, local climatic conditions, and many other factors, not all of which are perfectly understood.

The new idea of carbon farming embraces a wide array of practices to increase soil organic carbon while at the same time continuing to produce food and fiber for people and animals. It can be referred to as climate-smart agriculture because it can function both as a mitigation strategy, a way to suck carbon out of the atmosphere, and as an adaptation strategy, a way to help farmers adapt to climate-change related problems like drought and flooding.

As a method of carbon sequestration, carbon farming has a lot to recommend it: Unlike many reforestation projects, carbon farming doesn't remove land from agricultural production—instead it can actually increase yields by improving soil quality. And unlike high-tech proposals to

pump carbon deep underground, it relies on relatively inexpensive, proven methods for putting carbon back where it is known to be beneficial.

Getting Involved

Organizations working to improve the health of our soil:

- **Center for Food Safety** – it is the parent organization of “Soil Solutions”, a public interest and environmental advocacy membership organization. “In 2013 CFS began highlighting soil solutions to climate problems and has since emerged as a bridge between soil scientists, farmers, ranchers, policy-makers and the public.”
- **Kiss the Ground** – “Healthy soil has the miraculous ability to sequester carbon. And it’s not just carbon storage, healthy soil leads to: clean water, nutritious food, drought resistance, and restored habitats.”
- **Fibershed** – “Fibershed develops regional and regenerative fiber systems on behalf of independent working producers, by expanding opportunities to implement carbon farming, forming catalytic foundations to rebuild regional manufacturing, and through connecting end-users to farms and ranches through public education.”

Soil Heroes

John W. Roulac is the founder and CEO of Nutiva, the world’s leading organic superfoods brand of hemp, coconut, chia, and red palm superfoods. A longtime advocate for healthy people and ecosystems, with expertise ranging from home composting and natural healing to forestry and hemp agriculture, John has authored four books on environmental topics. He helped jumpstart the modern home-composting movement in the early 1990s and successfully sued the US DEA to keep hemp foods legal in 2001. He has founded four nonprofit ecological groups, including GMOInside.org.



Paul Hawken is an environmentalist, entrepreneur, journalist, and author. Starting at age 20, he dedicated his life to sustainability and changing the relationship between business and the environment. His practice has included starting and running ecological businesses, writing and teaching about the impact of commerce on living systems, and consulting with governments and corporations on economic development, industrial ecology, and environmental policy.

New Articles I found:

Markham, D. (2017). Beyond organic: Carbon farming is a pathway to climate stabilization and resilient soils. TreeHugger. Retrieved 17 October 2017, from <https://www.treehugger.com/sustainable-agriculture/beyond-organic-carbon-farming-pathway-climate-stabilization-and-resilient-soils.html>

Badore, M. (2015). Carbon farming: another low-tech climate solution. TreeHugger. Retrieved 17 October 2017, from <https://www.treehugger.com/sustainable-agriculture/carbon-farming-another-low-tech-climate-solution.html>

All information gathered from:

Sayre, L. (2017). How carbon farming could halt climate change - New Food Economy. New Food Economy. Retrieved 17 October 2017, from <https://newfoodeconomy.org/how-carbon-farming-could-halt-climate-change/>

Barker, D. (2017). Connecting the Dots on Ag and Climate Change. Center for Food Safety. Retrieved 17 October 2017, from <https://www.centerforfoodsafety.org/blog/4932/connecting-the-dots-on-ag-and-climate-change#>

Center For Food Safety, C. (2017). About Us – Soil Solutions. Soilsolution.org. Retrieved 17 October 2017, from <https://soilsolution.org/about-us/>

Kiss the Ground. (2017). Kiss The Ground. Retrieved 17 October 2017, from <https://kisstheground.com/>

About – Fibershed. (2017). Fibershed.com. Retrieved 17 October 2017, from <http://www.fibershed.com/about/>

John Roulac | Nutiva Founder. (2017). Nutiva. Retrieved 17 October 2017, from <https://nutiva.com/founder/>

Paul Hawken - Biography (2017). Paul Hawken. Retrieved 17 October 2017, from <http://www.paulhawken.com/>