WHITE PAPER: Strategy to Remove Greenhouse Gases

The Soil Carbon Sink

A Climate Change Solution Under Our Feet

David Yarrow, **Spring 2019**

Summary

Carbon Sequestration removes greenhouse gases from air by converting them to solid substances. To reverse climate change is to reduce CO_2 in atmosphere. Sequestering carbon in soil is a high priority to minimize global thermal overload.

Soil Carbon Sink is land dedicated to store CO_2 from air long-term. Soil is one of Earth's largest carbon sinks. Scientists calculate soil can absorb four times more carbon than is in air.

Carbon-Smart is a process with net removal of carbon from air to improve soil structure, boost fertility, increase yield, optimize nutrients, and assure healthy soils and farm profits.

Regenerative Agriculture is emerging to raise soil carbon with biocarbon, biochar, organic matter, humus, manure, cover crops, no-till, crop and livestock rotations. Soil carbon and food nutrient quality are now a citizen priority.

Soil Food Web are communities of microbes and larger lifeforms to convert minerals into nutrients, living cells & plants.

Changing Agriculture faces obstacles, needs coherent plans, requires cooperative action. Growers need training and support to rapidly adopt carbon-smart methods, and markets to buy their carbon-smart crops.

Farms, forests, lawns, and landscapes are front lines in this urgent effort to recarbonize, remineralize and revitalize soils in this century. Each **Soil Carbon Sink** is a small step in long journey to reverse global warming and climate change. Environmental protection begun in 1970s must mature into a **7th Generation Stewardship** of planet and nature.

PART ONE:

Soil Carbon Geophysics

Broken Carbon Cycle

In the next decade, humanity faces pivotal choices of a path to a future on this finite planet. Science warns greenhouse gases heating Earth's air and oceans will bring catastrophic changes for climate, ecosystem stability, food supply, and human survival. Science identifies human emissions as the main greenhouse gas source. Changes in human behavior, energy sources and farming are required to reverse these geophysical processes and move our species—and the whole planet—out of this danger.

Effects of Eating: A third of greenhouse gas emission is due directly to food. Agriculture—farm-grown food, fiber and fuel—is a huge emitter, beginning with carbon fuels, nitrogen fertilizers, tillage, monoculture, and exposed, eroding soils. More emissions occur to transport, process, distribute, store, cook, consume, and dispose—sewage and solid waste are mostly food. Total emission for food is greater than any other economic sector. What we eat, how it's grown, makes a difference.

This impact of eating on global climate should startle every planetary citizen. First, to grasp the terrible total effect of a daily universal human ritual. Second, to realize we each face a choice:

- eat food that continues current excess emissions; or
- eat food grown in ways that reduce greenhouse gases.

Third, by this simple ***carbon-smart*** choice, we embrace our responsibility to affect our human and planetary future, and reverse our rush to climate calamity.

> ***The food system accounts for one third of greenhouse gas emissions and 70% of water use.***
> ***–General Mills.*** *Advancing Regenerative Agriculture*

350 ppm: planetary red line

In 2008, climate scientists worldwide declared a consensus that 350 ppm is a key threshold for CO_2 in Earth's atmosphere. Beyond this, critical processes accelerate, such as melting glaciers, shrinking ice caps, intensified storms, extreme weather.

CO_2 exceeded this "safe" level in 1988, is now beyond 400 ppm, and still climbing every year. And we have yet to seriously commit to curtail our emissions.

350 ppm means reducing emission isn't enough. Even zero emission can't move humanity out of danger. We must lower greenhouse gas levels. To have hope for a future, humans must initiate processes to remove greenhouse gases by conversion to stable substances stored in safe places.

The Soil Carbon Sink

Soil—one of Earth's largest carbon sinks—is easy to access. All the carbon currently in Earth's air can be stored in soil—safe, solid, stable. Any effort to confront climate change must see soil as a primary carbon asset. Putting carbon in soil is a wise investment in a sustainable future.

Black is the signature of fertile soil. Carbon improves key soil properties such as tilth, structure, water holding, and aeration. Carbon also boosts nutrient cycling, ion exchange and microbe activity. Soil easily holds up to 10% carbon, with better fertility and productivity. Modern chemical-intensive agriculture has reduced carbon in soils to less than 1%.

Photosynthesis: Plants fix carbon into carbohydrates. Sugar is the great gift of green growing plants to life on Earth. Most organisms depend on sweetness captured from sunshine, water and CO_2. Plants use sugar as fuel for energy, and build their bodies from cellulose, the most abundant biocarbon.

Every spring, leaves emerge and photosynthesis begins. Plants remove so much CO_2 from air, levels drop 5 parts per million by July 1. Thus, plants are a principal ally in any effort to mitigate climate

> ***The world's cultivated soils lost 50 to 70% of their original carbon —much of it oxidized to CO_2.***
> ***–Rattan Lal, Ohio State University***
> *Carbon Management & Sequestration Center*

change. Step one to move carbon into soil is to ***Optimize Photosynthesis*** by growing maximum green cover on land. Cover crops and no-till to achieve this are advanced by USDA NRCS.

Soil Organic Matter: Plants die, fall to the ground, decay and dissolve into soil to become "organic matter." This organic soil carbon is essential to support and sustain full-function fertility for health plant growth. USDA Certified Organic farms maintain a minimum 4 to 5% of soil as organic matter, but up to 10% can be biocarbon. A new regenerative agriculture is emerging to accumulate carbon in soil, reduce tillage, increase biodiversity, optimize microbes.

December 1, 2015, at COP21 Paris Climate Summit, France proposed a goal to raise soil carbon in farmland by .4% per year. The French calculate this annual soil increase sequesters six gigatons of CO_2 to offset the 4.3 gigatons humans emit yearly.

Stable Humic Carbon: Microbes have enzymes to disassemble complex biocarbons such as cellulose. Some biomass molecules resist this digestion, especially carbon-carbon bonds in rings. Microbe breakdown results in residues of 10%, even 15%, of original biomass. The black matter that remains after microbe digestion is "humus." This stable carbon can stay in soil for decades, even centuries.

Carbonates: Carbon-Fixing Bedrock

Exposed to air, certain rocks react with CO_2 to form solid chemicals. Geology's main way to fix carbon is ***carbonates*** (CO_3) by volcanic rocks, such as basalt. Carbonates benefit life and soil as pH buffers for stable electrolytes, since cells thrive in steady, constant pH. Calcium is the most important carbonate rock: limestone.

Research reveals carbon-fixing rock reactions with CO_2 to create CO_3 depend on: 1) fresh-fractured rock from deep sources; 2) small size to optimize surface area; 3) accelerated digestion by catalytic enzymes of bacteria and a diversity of larger organisms.

Thousands of tons of igneous rockdust are piled in aggregate and stone quarries, with ongoing production. These residual fresh fines can undergo "accelerated weathering" in composts and soils. This synergy of rockdust, biochar and microbes in soil can unleash a cascade of further carbon-fixing sequestration.

Carbon/Nitrogen Ratio: The primary elements build living cells are in an ancient relationship and ratio. Nitrogen is #1 fertilizer and #2 greenhouse gas. Nitrogen/Carbon balance is fundamental to healthy soil, thriving biology and stable ecology. Holistic fertilizer strategy adds Nitrogen ***with*** Carbon ***in proper ratio***, and other nutrients, in a complete, balanced package for more efficient delivery, better response, less fertilizer, less stress for microbes, less leaching, less loss, and, yes, less emissions.

Biochar: super-stable biocarbon

Biochar is a special, super-stable charcoal made by baking plant biomass at 700–1000 degrees C. In soil, this black residue resists decay and weathering to persist centuries, even thousands of years. Charcoal use in soil began 6000 years ago by tribes in Amazon rainforest, and was discovered by scientists in the 1960s.

Biochar is our best strategy to sequester carbon. Soil can easily absorb 5% biochar, and easily contain 10%.

Biochar benefits to soil begin with improved structure, softer tilth, lighter texture. Biochar's micropore sponge allows each grain to hold water inside and keep soil wetter for longer. This baked biocarbon is hungry to adsorb ions and store nutrients to enhance fertility, improve fertilizer delivery, increase fertilizer efficiency, decrease fertilizer use, reduce leaching. Biochar's empty micropore architecture is shelter and habitat for microbes to form stable communities that boost plant growth and health.

Renewable Bioenergy from Biomass: Making biochar releases energy to harness. Research on biomass-to-energy technology includes "*micro-gasification*." *Pyrolysis* cooks volatile chemicals from biomass to refine by fractional distillation into liquid and gas biofuels. Renewable energy from biomass replaces fossil fuels to cut emissions and fossil fuel dependence.

Soil Carbon Cascades

Carbon added to soil—in particular, biocarbon, especially biochar—can initiate cascades of effects that store several times more carbon in soil and biomass. Carbon we put in soil can initiate biological processes that capture ever more carbon as biomass. Soil's capacity to capture, store and sequester carbon expands in a positive feedback cycle each growing season.

Plant Growth Cascade: Biocarbon-rich, mineral-charged, nutrient-balanced soil grows more biomass, to capture more carbon each growing season. As soil regenerates, plants grow larger, thicker, and photosynthesis kicks into higher gear. This mostly affects roots—unseen underground—not visible, measurable, above-ground top growth. This growth boost increases each year in positive feedback to increase soil capacity to capture carbon held as new green growth.

Regenerative agriculture pulls carbon from the air to store in soil to help land be more resilient to extreme weather.

Green Carbon Cascade: Plants make sugar in green leaves, then send sweetness down to roots to secrete into soil. Half or more of sugars plants make in leaves leaks into soil to create a "*sweet spot*" of these root exudates. Symbiotic microbes thrive in this enriched zone, share nutrients with each other and plants in an **Underground Carbon Economy**.

White Carbon Cascade: Soil isn't inert mineral dirt, but complex structure and infrastructure made by microbe digestion and breakdown. **White carbon**—living, dead, decaying bodies of microbes—is a significant soil carbon reservoir.

In 1996, USDA scientist Sara Wright detected a new carbon, named "Glomalin," after *Glomales* fungi that use it to grow whisker-thin threads of *hyphae* to search soil for water, minerals and nutrients. One third of soil carbon disappears into this previously undetected fungal form.

When fungi die, this glyco-protein residue is sticky with electric charges. This thin biofilm glues soil particles into larger "aggregates." Even sand coated by this fungal film clumps, attracts water and nutrient ions. Ultimately, this biological infrastructure is what identifies productive soils. Soil isn't inert mineral dirt, but a living matrix made by, for and of microbes.

Again, effects are underground, unseen, unmeasured. Too tiny to see without magnifier, microbes are mostly water, thus transparent and invisible. To detect and understand living soil carbon is a science frontier and pivot point for climate action.

PART TWO: Social & Political Action

Soil Carbon Stewardship

Soil Carbon Sink isn't mere idea, but geophysical resource. This potential pool of biocarbon was studied and quantified by science, and endorsed as viable, valuable strategy. While nature slowly creates soil carbon, our climate crisis needs rapid, massive, global soil carbonization. Humans must implement processes to accelerate natural Carbon Cycles to sequester carbon into sinks in years, not centuries. This strategy requires policies, projects and people guided by comprehensive, coherent plans.

As long as polar ice and glaciers continue to melt and recede, we're in a race against time. Fortunately, it's geological time.

Citizen Science Initiative

A **Soil Carbon Sink** is land dedicated as a long-term CO_2 store. Technically, "sequester" is minimum 100 years. **Soil Carbon Sinks** must provide reasonable guarantee any carbon conserved will be kept in soil at least a century. **Sinks** can be any size—one to 1000 acres. Type of land, legal status and storage mode are three of many variables to design and implement creative solutions to unique lands and uses.

The thinking and labor to create **Soil Carbon Sinks** will come from citizen-volunteers ready to do the obvious, right & urgent. Until strong political consensus exists for climate action, citizens will advance climate strategy. Most are excited and grateful for this **carbon-smart** opportunity to act on climate.

A **Soil Carbon Sink** is a practical public exercise in important facts of science, soil, carbon, nature, and politics. To design, install and maintain a Sink, people work together using science to benefit their community. Simple science to make a **Soil Carbon Sink** is over-shadowed by volumes of climate and soil science.

Soil Carbon Sinks are also potential sites for science research to gather data to study long-term carbon and climate cycles.

Commitment to Stewardship

Carbon, the element of life, brings us face-to-face with Nature. We recognize our dependence on carbon fuels, but few see the destructive emissions from farms and forests. To sequester carbon in soil can bring humans back into participation with the Carbon Cycle and other fundamentals of Nature.

Our physical task is to store carbon fixed from air by plants. **Carbon Cascades** reveal this simple task has complex context and multiple consequences. Yes, we must put carbon in soil, but to rebuild soil as a living tissue essential to regenerate plants and planet. Human relations with Nature need dramatic reform—reversal from "antibiotic" to "probiotic"—to embrace microbes as allies to nurture, not enemies to kill. Soil regeneration is a generous act to care for these least of all living organisms.

Stewardship conveys intimate appreciation. This ethic and ecologic high ground is essential, fundamental and global to earth repair, planet restoration and food security. We have knowledge and tools to make fully fertile, fully alive soil. Climate crisis imposes urgency to discard decades of soil-destroying land use.

Humanity must mature to adopt values and responsibilities of **Soil Stewardship**? Conservation stewardship understand soil is a bank, and **Soil Carbon Sinks** are investments in a future.

Start a Soil Carbon Sink

Public discussion of **carbon-smart** strategy must lead to sustained education efforts. Starting a **Sink** is an educational process. Show 'n tell, in-the-ground demo sites are crucial to illustrate the concept.

To put carbon in soil is physical activity. The thinking, expense and labor involved needs a small team with diverse skills. The paramount purpose is to create effective public displays of soil carbon sequestration. First efforts may be more symbolic than grand, as details of legal status, strategy, public awareness, and organization are explored and defined.

1) Land Dedication: Agreement to assure carbon put in soil, stays in soil, by continued carbon management. This can be a simple landowner agreement, or a complex negotiated legal status. Three essentials to an agreement:

a) land reserved for long-term stores of carbon
b) amounts and methods to sequester carbon
c) commitment to public show 'n tell

At the outset, public visibility is a priority for show-'n-tell. Public properties may be ideal, but a **Sink** can be empty urban lot, farm field, entire farm, forest, public park, schoolyard, roadway, airport, sports arena, church, or cemetery. Each is an experiment in legal state, management methods and public involvement.

2) Soil Assessment: survey current and potential carbon pool. Each plot of land is different, and one plot may have multiple soils. Each needs intelligent survey and tests to tailor a unique plan. The purpose isn't to dump carbon, but regenerate soil to initiate **Carbon Cascades** that multiply our initial effort.

3) Soil Plan: goals: carbon quantity, sources, capture

The First Soil Carbon Sinks

First: Washington State Capitol

Logical, political and visible place for public commitment to this fundamental climate action. With few changes, Capitol landscapes, lawns and gardens can be managed as long-term carbon sinks. Dedicating The Capitol to this priority purpose is valuable to build public awareness and political consensus.

Second: High School

Climate action is about a future for the next generations. A school yard is perfect place to recarbonize soil, where youth see every day examples of work they face in their lives. To design and install a **High School Soil Carbon Sink** is practical instruction to start that work.

Third: Golf Course

Highly managed landscapes with high standards and big budgets for groundskeeping. A few use horticultural charcoal on putting greens, but most are greenhouse emitters and water polluters. Zero carbon emission is a challenge to golf industry. Carbon-smart management delivers many benefits, like less expense for irrigation and fertilizer. Set a timeline to reach zero emissions and optimum carbon stores.

After one golf course signs as a **Sink**, challenge another to sequester more carbon than the first. Sports facilities like to compete; Win this one.

methods, # years, soil tests, etc. Typical plan adds lots of carbon year one, annual additions to reach optimum in 10 years.

4) Mobilize: Identify and gather allies. Stockpile resources, tools, equipment. Assess and plan logistics. Recruit and educate volunteers. Find finances.

5) Publicize: Design publicity and events to inform citizens and media on climate mitigation efforts. Focus public attention on **carbon-smart** options for action. Talk, speak & publish.

6) Carbon Reburial Ceremony: Official day to return carbon to soil. Install first load of carbon in soil, and other preparation work. Public event to spread awareness and invite participation.

7) Annual Events: Seasonal activities to add more carbon to the sink, collect soil samples to monitor carbon and key nutrients. Community carbon awareness education & action.

Soil Carbon

Bottom line is processes to actually move CO_2 out of air into soil—long-term. Proof of success is annual increases in soil carbon. Final measure is total carbon stored in soil. Multiple processes and endless varied methods can implement this strategy. No single, simple test can assay all kinds of soil carbon, so *Standards & Protocols* are needed to measure and monitor soil changes.

Optimize Photosynthesis

Sequestering begins when plants fix carbon into sugar. The density of green plant cover sets the amount of photosynthesis. Step one is to maximize this natural carbon-fixing of green plants, our best allies against climate change. Communities and landowners should assess and increase the green cover on land. Not only area, but also density, by fully mineralized soils, multi-story plantings, and multi-species covers.

Forestry

First is forests. Trees sequester carbon into wood, create topsoil and protect watersheds. Forest regeneration has lowered CO_2 to cool the planet. Tropic and temperate zone reforestation can sequester a few parts per million CO_2 as new growth. Ancient forests are huge, multi-level carbon sinks. Reforestation and afforestation with agroforestry, permaculture and other methods integrate tree, perennial and annual crops.

Pacific Northwest generates huge amounts of wood wastes from forestry and logging. Converted to biochar and compost, this woody biomass can regenerate soils, increase productivity, decrease irrigation, reduce water pollution. Potential exists to export biochar to biomass-poor regions such as MidSouth.

Large-scale biochar production opens opportunities to extract bioenergy. Pyrolysis and fractional distilling can yield biochar and process heat, plus liquid and gas biofuels to reduce reliance on imported fossil carbon fuels. One ton of wood biomass waste yields an energy equivalent to 5.5 barrels of oil.

Agriculture

Farming has huge areas under intensive use. Farmers, a tiny 1% of population, have been obstacles to practices to accumulate carbon in soils. Always, a few farmers step into new challenges, but most are restrained. Farmer psychology and farm economics make subsidies, incentives and cost shares essential to motivate change and quickly advance carbon-smart.

Farming is complex and diverse, with many crops, cropping systems, soils, management, climates, and more variables. **Carbon-Smart** must adapt to each crop, condition and circumstance. Communities and states can assess farmland potential as **Soil Carbon Sinks**, with carbon monitoring standards, technical & financial support.

USDA is studying carbon-smart, climate-active strategies, gradually adopting many, such as Regenerative Agriculture. USDA has begun to steer US agriculture onto a **carbon-smart** path, with technology deployment, technical assistance, finance, research, outreach, extension, and all. NRCS already has strong Healthy Soils initiatives of cover crops, no-till and microbes.

Urban versus Rural

Rural and urban priorities on climate differ. Farmland is a primary **Soil Carbon Sink**, but **carbon-smart** strategy in urban areas isn't as obvious. But urban communities have huge roles in **The Carbon Cycle**, great impacts on farms, abundant choices to cut carbon emissions, and optimize photosynthesis.

Metro areas have acres of managed landscapes in various categories: lawns, gardens, parks, other landscapes. Total land area to optimize photosynthesis and sequester carbon is significant to green-up urban spaces and use carbon-smart management. Public and private landscaping with carbon-smart methods and materials. Public facilities offer multiple opportunities to start soil carbon sinks.

Urban foresters are learning "never plant a tree without biochar, compost and microbes." Another ambitious, visionary project is to create green roofs.

Urban communities create huge volumes of biomass waste. Much is misplaced carbon that can be recycled into soil fertility. Some can be convert to biochar for soil sinks. Technology exists to extract and refine biofuels from biomass to replace fossil fuels.

Everyone eats every day, so we have daily opportunities to sequester carbon. Consumer demand for healthy, safe food is the prime driver for organic, sustainable and regenerative agriculture. "**Carbon-Smart**" can be a new keyword to label food consumers value, thus urban consumers can change farming.

Public Policy & Priority

Concerted efforts must articulate climate-smart strategy like **Soil Carbon Sink**s and **Soil Carbon Stewardship**. Extensive public conversations are essential to create awareness, encourage consensus and tell stories of solutions to climate and carbon.

Ultimately, consensus on **Soil Carbon Sinks** and **Stewardship** strategy must be embedded in public policy at many levels of government. Corporations need climate-smart policy, too. Leaders must advocate climate action policies, like Regenerative Agriculture and Nutrient-Dense Food. Official proclamations by elected officials can fan fires of carbon-smart awareness.

In particular, this climate urgency must manifest as the voice and passion of youth. They hold the key to leverage the future, and the energy for the tasks required. They need to know there are solid actions citizens can take to support climate mitigation.

PART THREE: Credit, Finance & Economics

Soil Carbon Bank

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Soil Carbon Sink is a geophysical resource, quantified by physical science, measured by volume and weight, dedicated by legal agreement. Removing carbon from air into soil has huge economic import. Carbon accumulating in soil can add value to land, to productivity, to an economy. If monetary value is fixed to this carbon, a **Sink** can become a **Bank**.

Soil Carbon Bank is a financial resource created by putting a price on carbon in a **Soil Carbon Sink**. Many creative ways can fix financial value to sequestered carbon. Some can tilt the table toward local and community economics. *Rules* beyond physical science govern how to create and trade this financial value.

Carbon Accounting

Somehow, society must put a price on carbon. A crystal ball can't predict how efforts to insert carbon in financial ledgers will turn out. Many experiments in carbon accounting—public and private—local, regional, national—are underway and under debate. With political and ideological side battles, and lurking "*dark money*" from fossil carbon industries.

Carbon taxes are controversial, detested, easy to defeat. A few cap & trade systems are testing their limits and weaknesses. Carbon credits (or subsidies) for farms, forests and businesses that soak up and hold onto CO_2 are argued. These useful tools can manipulate markets, prices, producers, or cash flow. None address fundamental structural and motive changes needed.

Carbon's costs are hidden factors missing in most economic equations. Climate change is just one such hidden, lost cost. Food, feed, fiber, fuel—the four fundamental resources—are all carbon. Community wealth is this annual harvest from Nature.

A bold, simple, holistic light to shine on murky money markets is ***carbon-backed currency***. Why not currency backed by a prime source of wealth? Lenin said a century ago, "Grain is the currency of currencies."

Carbon Sink into Bank

In agriculture, carbon has no value, is treated badly, steadily lost as soils degrade. A monetary value for soil carbon causes owners to pay attention and care about carbon. If soil carbon is valued as a land characteristic, this boosts its priority in decisions.

A **Soil Carbon Sink** is CO_2 removed from air and stored in soil at least a century. **Soil Carbon Sink** can be upgraded to a financial resource with monetary value. By several steps, a **Sink** can be structured into varied financial instruments—credit, benefit, asset, or security.

First, farmers and owners will want a tax break to reserve their land for a common public benefit: to conserve natural resources. A tax credit is incentive for owners to commit land to this greater good. Indeed, in our climate emergency, land dedicated as long-term carbon sink deserves support—financial and other.

Carbon Credit

Tax reduction is one of many land status that affect property value and assessment. Tax benefit has monetary consequences to factor into financial transactions, business contracts and economic equations. Deciding tax law for land dedicated as a **Soil Carbon Sink** will be creative, complex and locally adapted.

Financial values fixed to soil carbon allows this key resource to be a distinct factor in economic calculations. Soil and carbon then have significance to economy, as well as health and climate. Soil carbon is then relevant—not only in scientific equations—but a financial factor in economic decisions, short- and long-term.

New financial models must be designed to structure how soil carbon is valued, circulated and accumulated. Previous models were linear, single use, short cycle, simplistic. New paradigms are circular, recycle, multi-use, shared resources, and common wealth. Poster child of the new economic paradigm is Carbon itself, element of life, among the lightest, most mobile.

Soil Carbon Banking

Soil Carbon Bank as monetary value linked to carbon content begins as fixed value for measured minimum biocarbon—3 - 5%, depending on soil type and vegetation. A **Soil Carbon Bank** value increases as carbon content rises, varies with carbon market price. Higher carbon results in higher land value (or credit).

A mature, fully developed **Soil Carbon Bank** optimum is 10%.

Growers can harvest double dividends on a **Soil Carbon Bank**. First is initial extra value added to register a **Soil Carbon Bank** — immediate financial dividend. But better fertility, greater productivity, better health are long-term economic dividends.

Expense into Investment

Soil Carbon Bank can change a conversation with growers. Their costs to sequester carbon aren't "Expense"—like seed, fuel or fertilizer—but "Investment" in sustained fertility, continued production and long-term return. Money to properly install a **Soil Carbon Sink** is capital invested in a stable, protected reserve, held for future benefit, use and return—like money in a **Bank**.

This changes calculations of farmers and financiers to decide key operating issues.

Soil carbon is reliable to assess fertility and productivity.

Soil Carbon Reserve

Soil Carbon Bank, like any financial service, operates by rules and regulations. A key principle (embedded on US money) is "reserve"—a capital fraction held in "reserve" to buffer financial "stress" from over-extended credit or currency.

Similarly in soil, a certain percent can be "reserved" as carbon. **Soil Carbon Reserve** is this "bottom line" minimum fraction of stable carbon—the least level of carbon kept in the **Bank**.

Carbon Creates Community

A **Soil Carbon Bank** can be created by a series of steps.

First: Create a certified **Soil Carbon Sink**, with sponsor, plan, funding. **Sink** is at least 100 years—longer than one owner's life.

Two: Define public benefits of this sequestered carbon pool. Can be complex due to wide range of lands, methods, goals, etc.

Three: Fix a price for sequestered carbon as the base value to quantify the **Bank**'s physical and financial parameters.

Four: Issue **Carbon Certificates** for registered **Soil Carbon Reserves** as a statement of value..

Five: Authorization to trade **Carbon Certificates** in designated markets under specified rules and restrictions.