



## *Sustaining Soil Stewardship Trailblazing in the Missouri Delta*

### The Problems

**Water Quality:** Water pollution is a major physical and political issue in the Midwest. Water and soil are entangled in multi-faceted problems made obvious by brown streams and rivers after every rain as eroding silt clouds and clogs aquatic ecosystems. Carried with sediment are farm and lawn fertilizers— phosphates and nitrates that feed red tides in estuaries, dead zones on sea coasts. Biotoxic pesticides, fungicides, herbicides, and other chemicals also wash into watersheds to further degrade water quality, disturb aquatic life, and corrupt groundwater. Punitive solutions, such as U.S. Environmental Protection Agency regulations, have failed. New strategy is needed based on outreach, education and support for farmers to upgrade their operations.

**Weak Farm Profitability:** Farm economics are tilted against farmers. Expensive inputs—seed, fertilizers, chemicals, fuel, equipment—seldom meet income from crop sales. Farmers remain squeezed, with trivial influence on input costs or commodity prices, negligible effects on markets.

**Dependence on Annual Fertility:** Current farms depends on annual applications of excess amounts of energy-intensive, synthetic chemicals that burn off carbon, disturb soil biology, and disrupt soil ecosystems. This approach actively, severely degraded agricultural soils in the last decades, and is unsustainable.

**Food Quality, Purity & Nutrition:** Consumer expect higher quality food. Food industry scrambles to change production, processing & marketing to meet demand for safe, healthy food. Farmers need incentives, aid and advice to adapt farms to produce a new standard of food and deliver to new markets.

**Changing Climate:** The next decade of dramatic shifts in weather patterns will force changes in farming practices, production systems and marketing networks. Farmers must adapt to these changing circumstances and take advantage of emerging opportunities.

**Farmer Education for Transition:** Changing agriculture requires education and guidance for farmers to learn and adopt new soil strategies and farm technologies. In the face of increasing signs of disturbed climate, this adaptive farming strategy must be deployed rapidly and widely.

### A Solution

**Soil Stewardship:** Source of success and root of productivity in farming is soil. Our solution is sensible, sustainable soil stewardship as a primary principle and practice of farmers. Agriculture must be carbon-smart and probiotic, based on biology science with wholistic perspectives of microbes as essential allies, not enemies. The key is to regenerate full diversities of microbes in full-function communities—to shift from dirt as inert chemical media to soil as living biotic community.

Technology, materials and methods exist for farmers to cut fertilizers by 50% and curb toxic chemical use, yet still maintain crop yield, raise quality and improve soil structure, while building sustainable fertility. Soil can be regenerated without lower yields, or sacrificing income.

Carbon creates community. Carbon is a signature element of biology. Farmers must balance nitrogen with carbon, and deliver nutrients with carbon. Biocarbon upgrades soil structure and water capacity, builds habitat to foster stable microbe communities. This is carbon-smart.

**Soil Stewardship** begins by restoring fully operational, full service soil ecosystems. Caretaking engenders sustainable fertility built on biomass, rock minerals, microbes in nutrient cycles. This creates true abundance.

#### Soil Stewardship

##### Seven Principles & Practices

- 1. Cover Crops & Minimum Till**  
keep it covered & minimize disturbance
- 2. Optimize Photosynthesis**  
maximize green cover & carbon fixing
- 3. Increase Biocarbon**  
minimum 2%, ideal 5%, optimum 9%
- 4. Balance Major Minerals**  
charge soil battery, cation/anion ratios
- 5. Complete Trace Elements**  
get the most from the least  
sea products & rock powders
- 6. Inoculate & Populate**  
healthy microbe diversity & infrastructure
- 7. Close Nutrient Cycles**  
contain, retain and recycle nutrients

## What is needed?

**Commitment:** Farmers must be responsible caretakers to safeguard this thin living tissue at the land surface, committed to a **Soil Steward** relationship with their land. We need a way, with documents and ceremony, to recognize, respect and reward each farmer's agreement to preserve, nurture and strengthen soil, for now, and for the future.

**Carbon-Smart Biological Agriculture** adapts farming to 21<sup>st</sup> Century challenges, including soil health, climate change and food quality. "Carbon-Smart" knows soil is a carbon sink, and Carbon is the foundation for soil microbes and plants. "Biological" embraces soil's living organisms, beginning with bacteria, fungi, other microbes, earthworms, and synergies of this symbiotic community. This probiotic strategy can be "organic," or not; the central concern is to strengthen microbe biodiversity.

**Farmer Outreach & Education:** Farmers adopt new ideas and adapt operations if they are confident of effects on crop yield and profit, with high and rapid ROI. To rapidly deploy this strategy requires a focused effort to make farmers aware by a campaign of demonstration plots, public events and media. Enlist farmers to use carbon-smart methods and materials, gather data and histories for each participant. Education events and literature to teach the complex details. Staff must develop education materials and media, deliver outreach programs, and create demonstration plots with farmers for show-and-tell events.

**Farm Services & Support:** Growers need support in a 3-year transition to carbon-smart. First is to draft a farm plan to acquire resources and modify operations to fit each farm's unique production systems. The first year (or two) farmers need timely and targeted in-service guidance, technical advice and other support. This includes gathering data to evaluate response, document success, and provide feedback to improve each farm's program.

**Access to Materials & Technology:** To implement carbon-smart strategy, farmers need easy, timely access to new technologies, materials and equipment. Regional sources of biomass, biochar, compost, microbes and rock minerals must be developed for timely distribution and delivery to farms. Adopting innovative and emerging technologies often requires technical assistance and financing, and ongoing research and development.

## Our Proposal

We propose to deploy **Carbon-Smart Biological Farming** in the southeast Missouri Delta's extensive agriculture bottomlands, largely devoted to commodity crops. Our initiative at the Mississippi Delta's north tip is strategic to transform agriculture in other Midwest areas. We work with farmers, suppliers and resources in the region to implement carbon-smart farming. We seek funds for staff, services, documents, and programs to expand and accelerate this effort in ways orderly and effective as a model for other Midwest areas. Among these initiatives:

- Enlist farmers in a Soil Stewardship Association, and support their 3-year transition to carbon-smart methods
- Form Soil Stewardship network of farms, businesses, agencies and organizations
- Select a variety of farms and crops to create demonstration & education plots
- Encourage diversified agriculture with a broader diversity of crops, including vegetables, fruit and livestock
- Develop education tools, mentors and events to teach farmers new methods and ideas
- Develop regional resources: biomass, biochar, compost, rockdust, microbes
- Expand facilities and personnel to deliver key materials and services
- Access to new farm technologies: strip-till, compost tea
- Access to new local-regional markets for farm-fresh foods
- Gather, analyze and publish field and yield data, other documentation
- Conduct public relations to tell carbon-smart stories via media
- Work with existing networks, agencies, businesses, schools, and other regional groups to advance change in farming

### Carbon-Smart Benefits

1. Reduce farm operating expenses
2. Slow erosion and loss of topsoil
3. Reduce pollution in watersheds
4. Improve water retention & purity
5. Reduce greenhouse gas emission
6. Regeneration of soil ecologies
7. Initiate soil carbon sequestration

"No civilization has outlived the usefulness of its soils. When the soil is destroyed, the nation is gone."

—**Lloyd Noble**, fall 1949