Healthy Soils to Cool The Planet

A Philanthropic Action Guide

Acknowledgments

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About The Guide

This guide focuses on philanthropic and investment opportunities to promote healthy soils and soil carbon sequestration (SCS) primarily through changes in agricultural practices in the United States and globally. It was produced by Breakthrough Strategies & Solutions, a consulting firm based in Takoma Park, Maryland. A team of six consultants at Breakthrough Strategies interviewed 48 experts and practitioners and conducted an in-depth online survey of an additional 65 individuals, including policy experts, farmers, NGO leaders, philanthropists, private sector leaders, and government officials. A list of all those interviewed and surveyed can be found in Appendix VII.[1] In selecting individuals to interview and survey, we prioritized three criteria: 1) diversity of perspectives; 2) diversity of expertise; and 3) track record of engagement and influence. The interviews were global in scope, but the guide is focused heavily on the United States. Our team of consultants included soil health and soil carbon experts in France, Belize, California, Massachusetts, Washington, and Maryland. Key team members included Austin Badger, Taylor Herren, Suzanne Lutfalla, Calla Rose Ostrander, Henry Anton Peller, Betsy Taylor, and Kathy Washienko. Betsy Taylor served as lead author. This guide provides an initial roadmap for investing in healthy soils to help cool the planet and enhance resilience.

Promising new research, policies, financing instruments, and practices on soil organic carbon (SOC) have surfaced just in the last eighteen months. The attention given to land-based solutions at the Global Climate Action Summit in San Francisco in September 2018 was pronounced and the IPCC 1.5°C report released in October 2018 called for large-scale carbon removal through agriculture and other lands. This guide focuses primarily on agricultural soil carbon removal, but protection and restoration of forests, wetlands, coastal ecosystems, and grasslands are also essential for meeting climate action and sustainable development goals. We have included specific grant recommendations in the body of the guide to speed philanthropic action. Additional, equally important, grant recommendations can be found in the appendix of our online guide where grant recommendations and resources will be periodically updated. These are sample investment opportunities only and many worthy groups were unable to be included.

Many others contributed to this effort. We are grateful to our reviewers including: Austin Badger, Sarah Bell, Kevin Boyer, Jane Maland Cady, Sallie Calhoun, Virdiana Alcántara Cervantes, Noah Deich, Sarah Kelley, Suzanne Lutfalla, Dennis May, Ekwa Yawa Monono, Calla Rose Ostrander, Henry Anton Peller, Ruth Richardson, Kathy Washienko, and Lini Wollenberg. Additional help came from James Aronson, Mark Bradford, Clare Chenu, Ferd Hoefner, Greg Horner, Rosalie Kissel, Karen Lehman, Bradley Leibov, Keith Paustian, Shauna Sadowski, and Pete Smith. Lily Robles and Kim Le of Opus Design were outstanding to work with. Very special thanks to Austin Badger, Program Coordinator with Breakthrough Strategies. Austin provided extensive editing and project management. Thanks also to Kathy Washienko, Senior Partner, for researching and drafting the impact investment portion of the guide. We regret any oversight and thank all those who offered periodic comments and guidance. Views expressed in this guide are those of the author who worked to synthesize the input of others.

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Action Guide Summary

THE THREATS

We have an immediate planetary emergency involving multiple threats: climate disruption, a global water crisis, food insecurity for nearly one billion people, vanishing species, and mass migrations of people in search of basic conditions for survival. The UN has warned that we have only sixty more years of productive farming left if current levels of soil degradation continue.[2]

An October, 2018 report from the Intergovernmental Panel on Climate Change stated that avoiding catastrophic climate impacts now requires carbon removal from the atmosphere. The report urged immediate focus on carbon sequestration through natural lands.[3] A transition to 100% renewable energy is necessary but not sufficient. We need large-scale carbon removal from the atmosphere to have a safe future.[4]

THE PROMISE OF HEALTHY SOILS

Protecting and restoring global soils can help alleviate all of these threats and limit global warming by sequestering carbon emissions. When we build carbon in agricultural soils through regenerative practices, we achieve extraordinary benefits.

> "We must aim ridiculously high in order to succeed. I can tolerate failing, but I cannot stand the idea of not trying. We must think and act with speed, intelligence, and compassion and we must scale healthy soils and soil carbon sequestration globally."
>
> **— Saara Kankaanrinta, Philanthropist, farmer, and chair, Carbon Action Project, Finland.**

Positive Impacts

Climate Change Mitigation

1.5 to 15.6 gigatons of CO_2e removed annually by 2030 through agricultural emissions reductions, sustainable intensification of agriculture to halt deforestation, and soil carbon sequestration.

Water Conservation

For each 1% increase in organic matter, U.S. cropland could store the equivalent of 150 days of water flowing over the Niagara Falls.[5]

Food Security

Healthy soils increase fertility, yields and the nutrient value of foods, boosting human health and food access globally.[6, 7, 8]

Soil Stability

Restoring soils reduces soil erosion and desertification.[9]

Farmer Livelihoods

Farmers improve yields and reduce the need for costly synthetic inputs when they build healthy soils.[10,11,12]

Rural Jobs

Healthy soil policies and programs promote jobs and rural development.[13]

Habitat Preservation

Regenerative agriculture supports wildlife and pollinators.[14, 15]

Stabilization of Human Migration

Carbon-rich soils help secure water and food production necessary for life, helping reduce a common cause of migration.

THE ROLE OF PHILANTHROPY AND INVESTORS

A large financial gap exists between what can be done to increase carbon sequestered in soils and the funding available for such efforts. In an October 2018 study[16] on carbon removal, the U.S National Academies of Sciences recommended investing over fifty million dollars in agriculture and soil carbon removal in the United States alone.[17] Foundations can help support initiatives to unleash government and private finance. Early grant-making can demonstrate the success of regenerative agriculture practices, building momentum and optimism. Opportunities for grant-making are plentiful. Positive impacts are achievable within three to five years, but a long-term commitment is needed.

KEY MESSAGES

"A massive campaign and policy agenda to transform agriculture and restore ecosystems globally is needed right now."

—Professor Jem Bendell, Stanford University

- **Huge Potential: Changes in agricultural land management, combined with conservation and restoration of forests, wetlands and grasslands, can provide over one-third of the cost-effective climate mitigation needed to stabilize global warming below 2°C degrees**.[18] Emerging evidence on compost, silvopasture,[19] cover crops, storing soil carbon at depth,[20] and perennial crops indicate even greater mitigation potential in the quest to keep global warming below 1.5°C.
- **Levers for Change**: This guide identifies seven levers for change and five game-changing strategic initiatives for investment. Healthy soil solutions available today have the potential to make a scalable impact on climate change, food security, water quality and conservation, biodiversity, resilience, and deforestation.
- **Speed and Scale: The urgent scientific calls for land-based carbon dioxide removal should prompt investors to move with speed.**[21] We face the possibility of abrupt, irreversible climate change.[22, 23] Early strategic investments can leverage government and private sector funds to address climate mitigation as well as food security and adaptation in the face of climate impacts.
- **Demonstrate Early Success: There are opportunities to invest in states and regions where momentum for change is high.** Demonstrating the success of policies and practices on soil carbon, water conservation, soil fertility, job creation, and habitat protection will catalyze other donors and investors to help and set the stage for increased government investment.
- **Farmers and Ranchers: No policy framework or financing scheme will work if it is not grounded in the day-to-day realities of producers seeking to transform their practices in a positive direction.** All producers matter.
- **Action Matters**: This guide catalogs a robust agenda for research, yet it also emphasizes action-oriented research programs tied closely with farmers on the ground. We do not have the luxury of research that is not driven by a quest for real-world impact. Nor can we afford action not rooted in deep wisdom and solid science. We must act even as we keep asking hard questions.
- **Ambition: Foundations entering this field are encouraged to take risks, minimize the burdens of grant-seekers, and make investments commensurate with the speed and scale of the threats and opportunities facing us**. We must make the impossible possible.

The Basics

AMBITIOUS MILESTONES

To do what is required, bold yet still plausible milestones for success are essential:

By 2020

- A majority of nations have incorporated regenerative agricultural practices into their climate action and sustainable development plans.
- Investment in carbon removal (CDR) through soils from philanthropy, impact investors, governments and multilateral climate funds has increased dramatically to at least 100 million US dollars.
- 1/2 billion tons (0.5 gigatons) of CO_2e are eliminated or sequestered globally through agriculture.

By 2020s

- A priority has been placed on sustainable agroecological approaches to intensifying agriculture in order to help end net deforestation
- On-the-ground projects, policies, and financing mechanisms demonstrating the potential of emissions reductions and soil carbon removal and improved water management and yields through regenerative agriculture are adopted in over forty nations.

By 2030

- Emissions from agriculture, forests, and land use conversion are reduced 90% by 2030.[24]
- A minimum of five billion tons (five gigatons) of CO_2e are eliminated globally through farm emission reductions or stored in soils annually by 2030 through changes in agricultural land management.[25, 26, 27]

> "Emissions must peak by 2020. Some say that is impossible but impossible is an attitude, not a fact. Agriculture has a critical role to play, both in dramatically reducing emissions and by providing a sink to draw down carbon from the atmosphere."
>
> **— Christiana Figueres, Former Executive Secretary, United Nations Framework Convention on Climate Change (UNFCCC)**

HEALTHY SOILS INVESTMENT PRINCIPLES

- **Put farmers and ranchers first**. Systems must work for farmers and ranchers, both logistically and financially, or they won't be maintained.[28]

- **Take a whole systems perspective**, address root causes of problems, and advance all co-benefits[29] of building healthy soils. Recognize the need to reduce emissions from agriculture and enhance agricultural resilience in the face of climate impacts, while also increasing agriculture's capacity to become a carbon sink. Assess the entire agricultural climate impact, from livestock-related methane emissions, nitrous oxide from rice, deforestation, and carbon dioxide emissions from farm operations to carbon removal through regenerative practices.

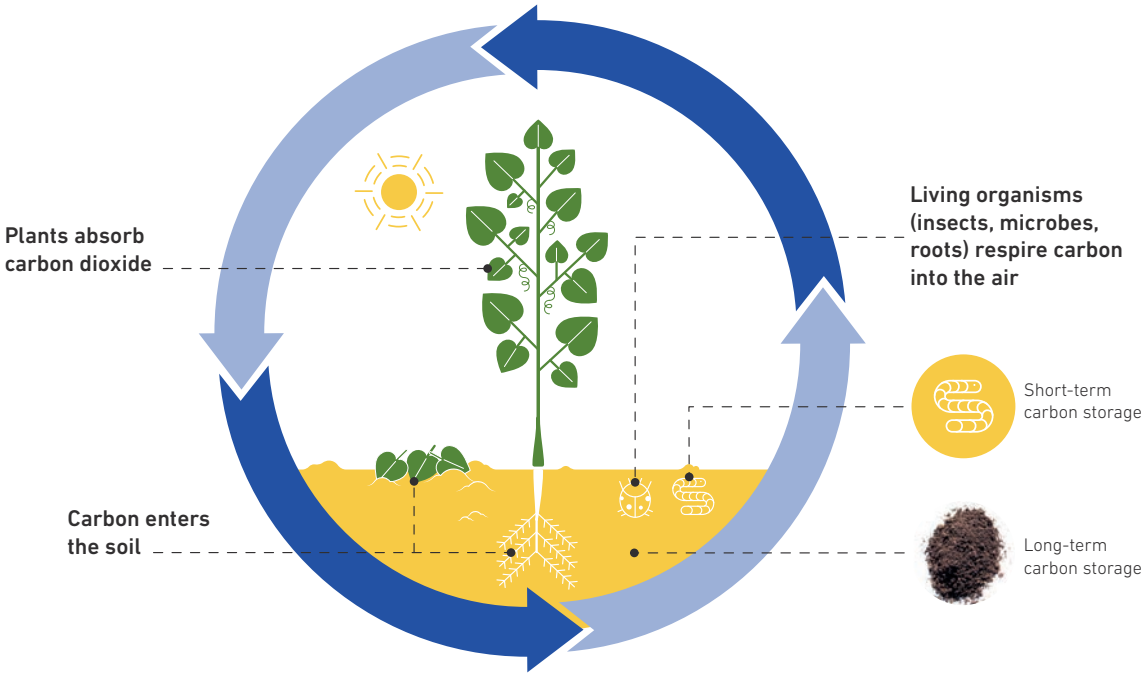
Place the work in the larger context of healthy communities, sustainable development, food and fiber supply chains, water filtration and conservation, and the need for food security. Don't insist that farmers focus primarily on the climate mitigation benefits of healthy soils.[30] It's important to understand the larger context within which producers operate.

- **Avoid unintended consequences**.[31] Being conscious of the potential harmful impacts of certain policies and finance proposals on women farmers, indigenous communities, smallholder farmers, and those who may be threatened with displacement by development, commodity markets, and some market-based schemes.
- **Embrace grantmaking approaches commensurate with the magnitude of the challenges we face**. Normal philanthropic behavior must be challenged in the context of the climate threat and food security. If we don't raise our ambition and take more risks, while working to support our grantees in every way, we are unlikely to make a sufficient impact in time.
- **Demonstrate and communicate success**. Build the field's momentum.

HOW DOES IT WORK?

Plants take in carbon dioxide, extracting it from the air by photosynthesis to make roots, stems, and leaves. Through processes involving plants and microorganisms, the carbon is then transferred to the soil. Living organisms and fresh organic matter provide short term carbon storage, and a small percentage becomes persistent carbon that can reside in the soil for decades, centuries or even millennia, providing long term carbon storage. The amount of soil organic carbon stored in a given soil is dependent on the equilibrium between the amount of carbon entering the soil and the amount of carbon leaving the soil from respiration. Soil respiration is a measure of carbon dioxide (CO_2) released from the soil from decomposition of soil organic matter (SOM) by soil microbes and respiration from plant roots and soil fauna. As long as we are sequestering more than we are respiring, we are storing carbon to help cool the planet. Historically, we have lost an estimated 133 gigatons of carbon from our lands and many of these degraded areas are prime targets for restoration and changed practices.[32]

The Carbon Cycle



BASIC PRACTICES FOR BUILDING AND RESTORING HEALTHY SOILS:

- Reduce soil disturbances like tillage
- Keep the soil covered and avoid having bare soil
- Feed the soil—diversify the biology of the soil through natural inputs
- Maintain living root systems to support underground fungi and soil microbes
- Diversify farming systems and crops
- Integrate crops, animals and trees wherever possible
- Prioritize deep rooted and perennial crops to enhance soil carbon retention
- Limit the use of synthetic fertilizers, pesticides and herbicides that damage the biology of soils and have other harmful impacts on farm ecosystems and workers
- Manage animals to build rather than deplete the soil
- Protect agricultural lands that have high carbon content (peatlands, etc.)
- Protect forests and wetlands by avoiding conversion to agricultural land

HOW MUCH CAN WE STORE?

Published estimates of soil carbon sequestration's mitigation potential vary from 1.5 to 15.6 billion tons of $CO_{2eq}.Y^{-1}$

Study	**Annual Mitigation of Agriculture and Grazing Land in 2030 Gt $CO_{2\,eq}.y^{-1}$**	
Paustian et al. 2016 Climate-Smart Soils	1.5–8.0	**United Nations Environment Programme emissions gap estimate:** **11–13.5 Gt $CO_{2e.q}$ in 2030**
Griscom et al. 2017 Natural Climate Solutions	4.4–6.9	
Hawken 2018 Drawdown	4.8–8.7	
Soussana et al. 2017 Matching Policy and Science	7.2–15.6	

These estimates vary based on divergent assumptions about the price of carbon, the agricultural practices incorporated into models, presumed scales of adoption, impact of warming soils, and other factors. New estimates are being published for some practices (agroforestry, organic waste management/compost, perennial crops) that will add to our understanding.

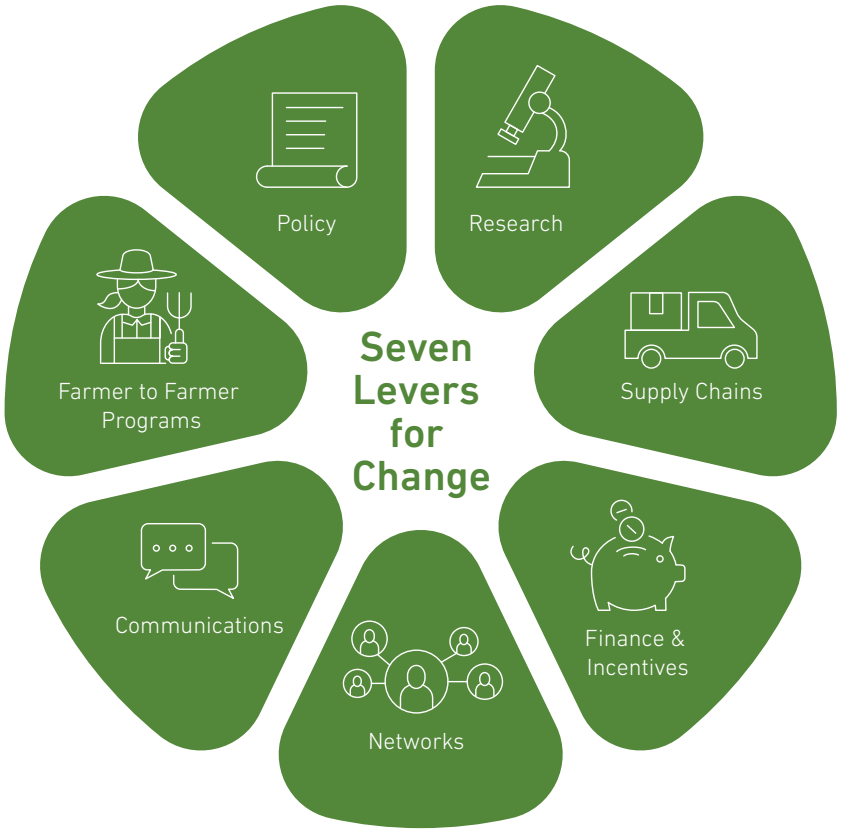
Philanthropy in Action

This guide prioritizes seven levers for change and features five game-changing strategic initiatives for scaling the field and maximizing impact. We identify priorities for philanthropic support, obstacles to overcome, and sample grant opportunities and impact investments in the United States and globally. This is not a comprehensive list of needs and opportunities and many worthy groups and projects were unable to be included. Foundations must establish a clear set of priorities for advancing regenerative agriculture and track progress and gaps in addressing the field's needs broadly.

"The William Penn Foundation is funding a long-term research partnership between the Rodale Institute and Stroud Water Research Center focusing on the relationships between soil health, stream health, and business health. These grantees support a suite of farming practices that are good for clean water, the climate, and farm revenue."

—Chris Kieran, Program Associate, William Penn Foundation

Learn more at:
https://www.stroudcenter.org
https://www.rodaleinstitute.org



SEVEN LEVERS FOR CHANGE

Change Lever One:

FARMER TO FARMER PROGRAMS

A growing number of farmers are focusing on building soil organic carbon and healthy soils, yet many remain unaware of the benefits. Farmer to farmer programs can help scale-up agricultural innovations because farmers learn best from other farmers who have already demonstrated success. Producers prefer farm-based knowledge sharing, trusted soil conservation experts and extension agents, and on-farm experimentation.[33] By supporting innovative farmer networks and training programs in key geographies, we can demonstrate and communicate early success—a critical prerequisite to implementing policies, supply chain transformations, and financing. It is important not to place farmers into "good" and "bad" categories, but to work for positive change with all producers. Partnering with organizations that have long-term relationships with local communities is a key to having impact. We must reduce the risks for farmers and provide initial support for new seeds, equipment, and training as they transition from conventional practices.

Priorities for Philanthropic Support

- Fund innovative technical assistance and peer to peer learning that reaches large numbers of farmers in support of regenerative and climate friendly practices. Partner with agricultural and soil conservation extension services.
- Demonstrate the business and livelihood case for farmers—the value proposition must be strong (improved yields, water conservation, diversified products, increased resilience to climate variability, stronger bottom line, accessible markets, and demonstrated consumer demand)
- Support women in agriculture. Women play key roles in farming households, particularly in poor rural areas in Africa and Asia, but they face barriers to credit, extension services, and land ownership and rights. Women are critical to the future of food security and healthy soils in many parts of the world.[34]
- Support pilot projects that bridge farmers with researchers. Support demonstration projects and farms that include baseline data on soil, changed practices, and results for carbon, water, depth of soil, yields, and other benefits over short time horizons. Look for projects that engage historically disadvantaged farmers and communities. Underwrite affordable and easy-to-use tools and workshops for on-farm testing of soil carbon, water content, and related soil health metrics.
- Support influential coalitions of farmers and their rural and urban allies to mobilize in the policy arena.

"Women are (and should be) the leading voices in regenerative agriculture. That's why the majority of the businesses and organizations we directly support are owned or led by women. Women's Food & Agriculture Network (WFAN) is comprised of over 10,000 women in agriculture and lifts up these voices by engaging women in building a just and healthy agricultural system through individual and community power."

—Sallie Calhoun, Rancher and Co-Founder, No Regrets Initiative

Learn more at www.wfan.org

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I of our online guide. www.breakthroughstrategiesandsolutions.com/soilguide

1. **Soil Health Academy**—Launched in 2018, this U.S. based academy is led by renowned farmer Gabe Brown and three exceptional carbon farming experts who are providing in-depth training to farmers across the nation on healthy soils and farm plans to sequester carbon. They have a "train the trainers" scalable model for the United States and are in very high demand.

   Website: https://soilhealthconsultants.com

   Contact: Ron Nichols, ronnichols.author@gmail.com

2. **Conservation Districts**—There are over 3,000 official conservation districts in the United States that provide technical assistance and tools to help farmers and landowners manage their land and water. Design a Request for Proposals (RFP) process to rapidly strengthen the existing soil conservation programs in the United States. Invite a shared proposal from the most innovative Districts to expand best practices for soil carbon sequestration and emissions reductions in agriculture to additional regions by using trusted messengers and conservation districts. Explore a request for funds from the National Association of Conservation Districts. In California and a few additional lead states, explore support for the Carbon Cycle Institute's Carbon Farming training program.

   Website: http://www.nacdnet.org/

   Contact: Laura Demmel, NACD Director of Development, 202 547 6223, info@nacdnet.org

   Website: https://www.carboncycle.org/

   Contact: Torri Estrada, testrada@carboncycle.org

3. **Centre for No-Till Agriculture**—CNTA operates in Ghana and across the African continent. It utilizes field-level demonstrations, community-based training events and peer-to-peer communication to empower and train farmers. CNTA operates a full-scale training and demonstration facility where farmers participate in a variety of programs. Additionally, CNTA's technical staff travels widely, interacting with farmers in their fields and providing hands-on support.

   Website: https://centrefornotill.org

   Contact: Kofi Boa, kboa55@yahoo.co.uk

Possible Barriers to Overcome

- Many farm extension and training programs are dominated by large-scale industrial agriculture experts with a bias towards chemically dominated agriculture and limited knowledge of soil biology. It is critical to delve into the precise details of any training program.
- NGOs working on healthy soils are not always rooted in local conditions, relationships and culture. Look for NGOs with deep cultural competence and agrarian experience.

Change Lever Two:
POLICY

Good policies can tip systems towards transformation, helping change the behavior of individuals and groups. Harmful policies create barriers to transformation by providing financing and incentives for agricultural practices that damage soil. We need to rapidly experiment with and evaluate policy tools to help governments have the evidence they need to implement ambitious new actions for climate mitigation, adaptation, rural economic development, habitat protection, and food security. There are myriad policy options to promote soil carbon sequestration and healthy soils at the local, state, federal and global level:

- Watershed protection and water conservation policies
- Food and farm waste management regulations and mandates
- Rural economic development
- Land conservation programs
- Smallholder and new farmer programs
- Carbon pricing revenues
- Tax policy
- Farm and crop insurance policies
- Government and public/private research programs
- Government procurement
- Composting and municipal waste programs
- Elimination of subsidies to negative practices
- Zoning of land
- Land tenure protections
- Investment incentives
- Infrastructure investments
- Nutrition and food security programs
- Consumer health
- Adaptation and emergency planning
- Funding for extension and technical assistance services

A WORD ON
Terminology

As is often the case, we discovered groups with very strong attachments or aversion to particular language: regenerative agriculture, agroecology, climate-smart agriculture, organic agriculture, carbon farming, sustainable agriculture, natural climate solutions, working land solutions, and more. We recognize that these terms harbor considerable meaning and may help draw critical lines of inclusion and exclusion along geographic, economic, and ideological lines. At this stage of our planetary crisis, we encourage close examination of the values, knowledge, and research that inform the field and a shared focus on land practices that restore and sustain our soils and rural livelihoods. We have opted to use several of these terms in the guide and hope that this will not cause obstacles for our readers.

"The Thornburg Foundation seeks to improve the health of New Mexico's working rangelands and farmland at a significant scale across the state. To do this, we fund partners who champion policies and practices that incentivize land management practices and stewardship on private as well as public lands that result in improved land/soil health, conservation, and farm or ranch profitability. One critical partner helping us achieve our goals is the Western Landowners Alliance (WLA)."

— Garrett Thornburg, Founder and board chair, Thornburg Foundation

Learn more at https://westernlandowners.org

Priorities for Philanthropic Support

- **Municipal Action** — Support city-wide policies to capture food waste for conversion to compost to build soils.
- **State Action** — Support state-based policies to advance healthy soils.
- **Federal Action** — Invest in a suite of policies that can be advanced during the 2020 US elections and in 2021.
- **Global Policy Toolkit** — Work in partnership with existing support networks and groups[35] to help nations incorporate soil carbon sequestration into their climate action plans and nationally determined contributions (NDCs) as well as sustainable development goal commitments (SDGs). Support a policy toolkit for use at the global level and for nations ready to add land-based carbon removal commitments on mitigation as well as adaptation to their climate action plans. Help nations incorporate carbon drawdown commitments into high-level international venues such as the 30th anniversary of the Rio Earth Summit and Biodiversity Convention.
- **Oppose Harmful Subsidies** — Support a global analysis of existing subsidies to industrial agriculture. Highlight positive alternatives, e.g. prohibition of conversion of grassland to cropland under the EU's Common Agricultural Policy.
- **Share Data** — Advance policies that will help the field get to scale and incorporate critical data collection and verification of C in soil.
- **Training Programs** — Promote policies that establish farmer to farmer training and financing programs; support expansion of extension services and other assistance for farmers.
- **Land Protection** — Advance policies directed at stopping deforestation, land conversion, degradation of land, and disruption of high carbon lands. Promote permanent protection of farmland.

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

1. **National Healthy Soils Policy Network**—Sparked by California Climate & Agriculture Network, this farmer centered network of NGOs in the United States is working to advance soil carbon sequestration and healthy soils through education and policy advocacy at the state level, currently in twelve states. This incubator helps sustainable agriculture leaders share policy models, communications strategies, and tools to better provide technical assistance and educational outreach in support of healthy soils at the state level, including advocacy for soil policies.

   Website: http://calclimateag.org/national-networks/

   Contact: Renata Brillinger, renata@calclimateag.org

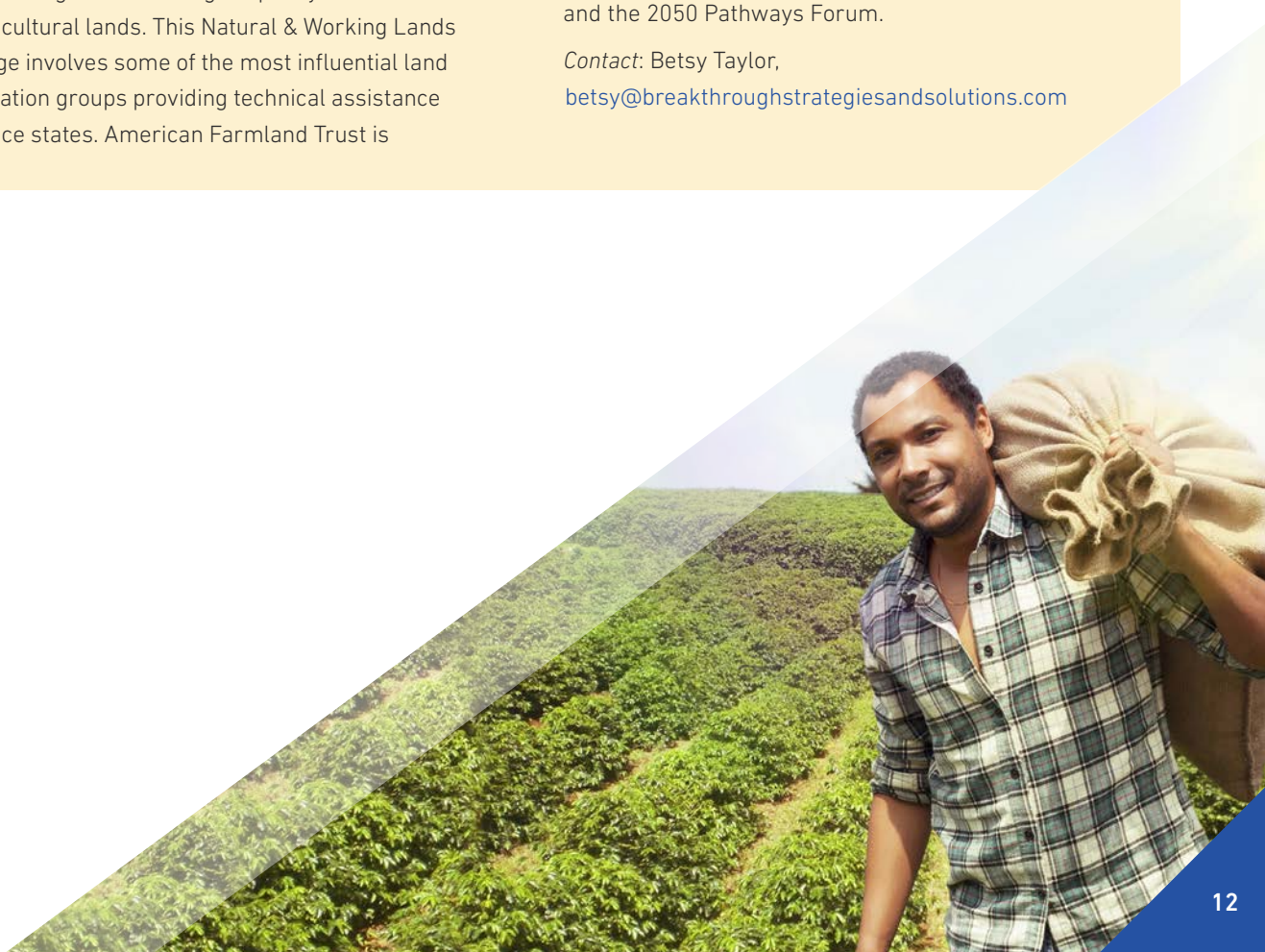
2. **Natural & Working Lands Challenge**—A coalition of major land conservation organizations is partnering with the U.S. Climate Alliance, a bipartisan commitment of seventeen U.S. governors, to uphold the Paris Climate Agreement, maintaining natural and working lands as a net sink of carbon and protecting and increasing carbon storage capacity in forests and agricultural lands. This Natural & Working Lands Challenge involves some of the most influential land conservation groups providing technical assistance to Alliance states. American Farmland Trust is championing farmland protection, reduction of on-farm and transportation-related emissions, and carbon sequestration in the context of this larger coalition.

   Website: https://www.farmland.org/

   Contact: Jimmy Daukas, jdaukas@farmland.org

- **International Policy Advocacy and Toolbox**—Issue a Request for Proposals (RFP) for a flexible online toolbox featuring policies and programs that nations and sub-national governments can consider for their NDCs for mitigation and adaptation rooted in agriculture. We need to more formally integrate soil carbon sequestration into the United Nations Climate Change registry of nationally appropriate mitigation actions. An initiative along these lines should be completed ideally prior to the Koronivia Joint Work on Agriculture workshop on soils to take place in June 2019, coupled with public and private investment in a few key nations that can demonstrate progress by COP 26 in 2020 when soil carbon will be a focal point of discussion. This could be promoted in numerous venues including the FAO Soils Portal.[36] Groups to consider for this effort include the NDC Partnership, the Carbon Neutrality Coalition, FABLE Consortium, the 4 pour 1000 Initiative, World Resources Institute, and the 2050 Pathways Forum.

  Contact: Betsy Taylor, betsy@breakthroughstrategiesandsolutions.com



"TomKat Ranch Educational Foundation is a proud supporter of Point Blue Conservation Science. Point Blue's commitment to credible and actionable science, and their Rangeland Monitoring Network makes them an invaluable partner to us and other practitioners and advocates of regenerative agriculture."

—Wendy Millet, TomKat Ranch Educational Foundation

Learn more at https://www.pointblue.org/

Possible Barriers to Overcome

- **Agribusiness Stronghold**—Agribusiness interests hold excessive financial and political influence on many governments and policy makers.[37] Certain policies, such as crop insurance and price support schemes frequently create barriers to practices that build healthy soils.
- **Duplication of Efforts**—We may face a proliferation of competing initiatives and policy recommendations in the land-based solutions sector that complicates things for policymakers. Identifying and highlighting a suite of policy options that most stakeholders can agree on will be key.
- **Fissures between Land Conservation and Agriculture groups**—There are tensions in the American NGO community over U.S. Farm Bill priorities. Climate-oriented donors should seek out NGOs with deep knowledge and track records on agricultural policies—not just the familiar environmental NGOs.
- **Lack of a Circular Economy**—Few policies address whole systems and some of the emerging positive models have not been widely shared.[38]

Change Lever Three: RESEARCH

There is a huge upsurge in research on soil carbon sequestration and more broadly on healthy soils. Yet too often, research happens through a narrow-siloed approach or with insufficient connection to practitioners and policy makers. There is an urgent need to connect people, knowledge, and data and to break down the barriers between disciplines and types of stakeholders. Many of those we interviewed called for a systems approach to research agendas, linking farmers, soil experts, social scientists, economists and participatory farming networks to gather data and share evidence. Others called for a keen focus on quantifying ecosystem services and economic benefits and to scaling up while transferring lessons learned across geographies. Still, others called for more support for young academics and women researchers. We must prioritize research that will lead to actual results in terms of changed practices, enabling climate smart agriculture to scale up as fast as possible. Critical analysis is still needed about the carbon and nitrogen cycles in soils, how practices and soils vary across geographies, the residence time of carbon in soils, and the equilibrium reached after implementing new practices. An October 2018 National Academies report includes several recommendations for research priorities related to soil carbon sequestration on working lands.[39] The 4 pour 1000 Initiative has developed a list of research priorities as well.[40]

Priorities for Philanthropic Support

BIG PICTURE

- **The Potential**—We need to better demonstrate the full potential of agricultural soils to help the world stay below the 1.5°C to 2°C threshold of global warming for mitigation but also for adaptation.[41] Current integrated climate assessment and IPCC models do not adequately incorporate updated research and data sets and often rely too heavily on Bioenergy with Carbon Capture and Storage (BECCS)[42] and/or traditional conservation agriculture nearly exclusively. These technologies have a role to play, but there are other practices for scaling the field that the global models have largely excluded to date—including compost application and the full potential of perennial crops and smallholder agroforestry (including practices well beyond alley-cropping, for example.) By demonstrating the potential with field-based evidence, investment can be attracted to the field for scaling up the practices. The potential for soil carbon sequestration ideally will include a "simple" quantification of the benefits for farmers of different management options.
- **Measuring, reporting and verifying**—If we can't measure carbon and other positive attributes of soil with relative ease in diverse contexts, it is difficult to scale the field. If land managers and farmers are to receive financial benefits for soil carbon sequestration practices and if nations are to count soil carbon sequestration in their climate action plans, we need methods for verifying positive carbon drawdown results. A sprint is underway to develop standardized, tiered approaches and methodologies[43] for measuring, reporting, verifying, and monitoring carbon in soil (MRV). There are new tools, models, and methodologies for assessing soil health, GHG emissions from farms, and soil carbon. We need to better assess laboratory analysis versus field analysis versus satellite technologies, ideally developing simple integrating proxies for soil carbon sequestration. This is urgent and there are several projects worthy of support. The state of California has used the Comet-Planner tool[44] with success for its Healthy Soils initiative and this tool and its foundational application, COMET-Farm,[45] are being upgraded and considered by other states. The International Organization for Standardization (ISO) is also working on new standards and guidelines for soil carbon stocks.[46] In November 2018, the National Academies of Sciences proposed establishing a national on-farm soil monitoring system in the United States through the U.S. Department of Agriculture. The monitoring system would provide the ongoing data necessary to reduce uncertainty around carbon storage in soil types and farming operations over time. We need an international standard for MRV, connected to GHG inventories and IPCC protocols.
- **Farmer/Research Networks**—Farmers have knowledge that academics often overlook or dismiss and vice versa. The best land-based research integrates the deep and local wisdom of those on the land with the research findings from academic experts. Investors might consider funding pilot efforts that integrate diverse knowledge when working to transform particular landscapes and regional agricultural systems. Establish long-term partnerships and joint projects between academic experts and action-oriented groups working with producers. This methodology is applicable to several of the research questions noted below.
- **Soil Carbon Cycling**—We need to improve our understanding of carbon cycling in soils. This includes factors such as the role of microbes, residence time of labile and persistent pools of soil C in land and at varying depths, SCS rates, how to stabilize C in deep soils, role of perennial crops, deep-rooted crops, links with nitrogen and water cycles, the role of underground mycorrhizal fungi networks, seasonal nutrient flows, and the impact of warming surface temperatures on soils. Critical analysis is needed to explain and predict how management practices translate to desired changes in soil carbon and nutrient cycling at any specific location. We also need genetic analysis of relationships between plants and soil microbes, endophytes, and fungi.
- **Soil mapping**—Soil mapping and on-the-ground soil monitoring networks can provide farmers, scientists and government officials with baseline data they need to monitor improvements in soil health. While extensive soil maps exist, more detailed and carbon baseline

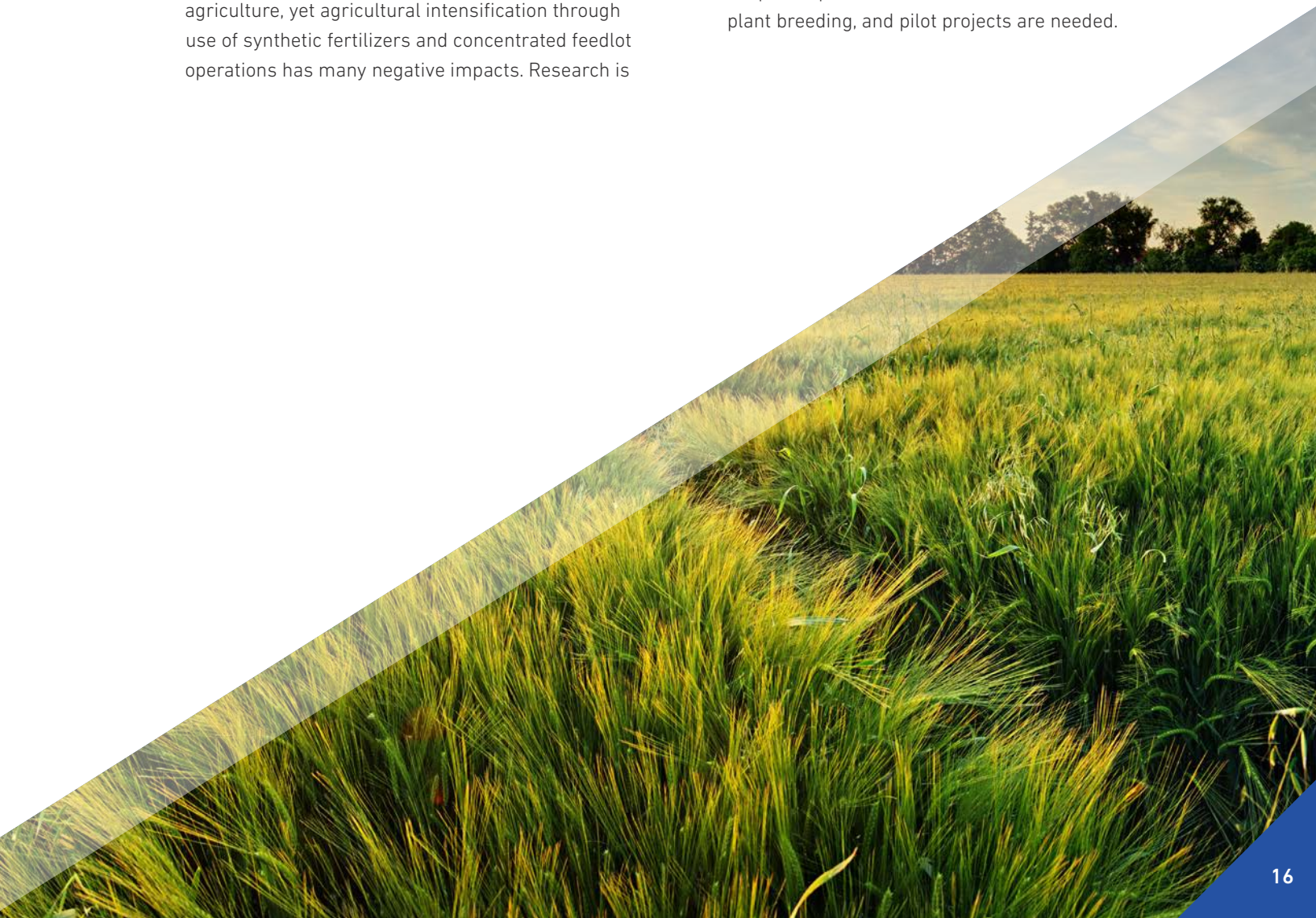
maps are needed. Several mapping projects are in the works.[47] Ground-based soil monitoring networks, with periodic remeasurement, are in place in several countries, particularly in Europe, but a national-scale network is still lacking in many countries, including the US.[48]

- **Healthy Soils Healthy Humans**—We need to better understand the links between healthy soils, healthy humans and healthy ecosystems. This is a cutting-edge field with emerging data on the human biome and the soil biome. What is the nutritional value of food coming from healthy versus degraded soils?[49] What are the implications for the human immune systems, brain function, and longevity?
- **Economic/Business Case**—Researching and demonstrating the business case for regenerative practices—at the farm as well as national level—is critical. Support research on how to develop business cases around the supply chain of regenerative agricultural products. Farmers are bombarded with information and training about the benefits of chemical fertilizers, heavy equipment, and short-term maximization of yields without disclosure of financial and long-term soil health risks. Regenerative practices can build soil, yields, and long-term water retention while decreasing on-farm costs.
- **Academia**—We need to invest in the emerging generation of thought leaders and experts. There is insufficient science around complex agricultural systems, as opposed to annual monocultures. Consider endowing a regenerative agriculture tenure track position or graduate fellowships. Explore social and economic research focusing on rural economic development and jobs generated by climate smart practices.

PRACTICES

- **Agroforestry**—The IPCC scenarios include minimal potential for agroforestry,[50] yet nearly every expert we interviewed agreed that integrating trees into farming and ranching systems can achieve very positive results. We need demonstration projects in diverse landscapes and more analysis on the multiple benefits—both short-term and long-term—stemming from incorporating trees into crop, grazing, and diverse farming systems. This is especially essential in the tropics where a greater focus on agroforestry for smallholder farmers might help stop deforestation from slash and burn tactics. We also need to better understand how trees and crops complement each other versus compete for water, sunlight, and nutrients. More work is needed on multi-tiered polycultures and food forests especially in the tropical regions as a strategy for food security, biodiversity, agricultural intensification and mitigation.
- **Compost**—Coordinated research and action that links the problems of food and animal waste with the direct solutions compost production and soil carbon can provide. This is a classic systems approach that holds enormous promise for mitigation, resilience, water management, and healthy food systems. There are major urban waste management initiatives globally but too few are taking a circular economy approach. Organic compost can help us achieve multiple benefits.
- **Cover Crops**—Cover crops are vigorous plants used especially by annual grain growers to dramatically reduce agrochemical use, build topsoil, conserve water, and more. Cover crop mixes (or 'polycultures'), often with ten or more species, have been found in multiple parts of the world to offer maximum benefits to soil carbon sequestration, weed control, and more. Comparisons of soil carbon consistently find 20 to 100% more carbon in soils under nitrogen-fixing plants.[51] Action-research is needed to develop best practices and locally-adapted cover crop species in diverse locations, and to demonstrate the benefits of cover crops to more farmers and policy leaders.

- **Biomass** — Biomass is waste material from plants or animals that is not used for food or feed; it can be waste from farming or horticulture, food processing, animal farming, or human waste. Biomass for sequestration and other co-benefits needs further study to better understand its role for decarbonization and to avoid unintended impacts on food security and land access.
- **Ecological Restoration** — Restoration, natural regeneration, and reforestation will provide social, ecological and economic benefits for our climate and for rural and indigenous communities. These benefits need to be quantified and communicated.
- **Grazing Animals for Food and Fiber** — Peer reviewed research is needed to better understand the soil carbon sequestration impacts of holistic grazing strategies for both food and fiber animals. Data sets are still limited.
- **Sustainable Agricultural Intensification**[52] — We need to avoid further conversion of forested lands to agriculture, yet agricultural intensification through use of synthetic fertilizers and concentrated feedlot operations has many negative impacts. Research is needed to demonstrate the potential of sustainable intensification practices to boost yields and farm income. This might include deeper investigation into agroecological practices; precision farming that reduces chemical inputs; green manure; use of compost, diversified agroforestry, manure and crop residues; plant breeding and seed improvements; microbial inoculants; biochar; organic fertilizers; plant microbiomes to strengthen crops against disease and drought to increase crop yields; and parallel efforts to shift global dietary preferences to reduce consumption of beef. Securing new profit streams for small and large farmers is key; consider ramping up revenue flows from perennial crops used for bio-based plastics — achieving multiple co-benefits for the planet while boosting farm revenue.
- **Deep-Rooted and Perennial Crops** — Perennial crops are grown on at least 153 million hectares (378 million acres), 11 percent of world cropland.[53] These crops hold the promise of food security as well as deeper sequestration of carbon in soils. More research, plant breeding, and pilot projects are needed.



"McKnight's Collaborative Crop Research Program (CCRP) is dedicated to supporting ecologically focused research and educational processes through farmer research networks (FRN). The FRN approach engages farmers with other key stakeholders throughout the research cycle. One innovative project is in Niger where women with the FUMA Gaskiya FRN are improving family welfare through diversifying production and building soil health with human urine, wood ash, and compost."

— Jane Maland Cady, International Program Director, The McKnight Foundation

Learn more at https://www.mcknight.org/programs/international/collaborative-crop-research/

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

- **Woods Hole Research Center**—The Woods Hole Research Center is developing a Restoration Opportunity Model with more detailed mapping of land restoration potential globally. By generating global data sets with sufficient spatial resolution and biophysical completeness, they seek to provide on-the-ground practitioners with robust decision-making and progress-monitoring tools that are fundamental to realizing the potential of natural climate solutions. This will allow governments, NGOs and climate modelers to try out various scenarios and help proliferate natural climate solutions.

  Website: http://whrc.org/

  Contact: Wayne Walker, wwalker@whrc.org

- **Chico State Regenerative Agriculture Initiative**—Professor Cynthia Daley is leading a new "whole systems" research agenda to advance a broad range of regenerative practices. The program includes interdisciplinary teams and a collaborative network of applied research scientists, learning centers, and demonstration sites with partnering farms and universities. Investment in this program will help advance understanding of policy instruments, financing schemes, regenerative practices, and a deeper understanding of no-till organic cropping systems, compost applications in rangelands, livestock grazing systems, and organic dairy operations working to sequester carbon in soils.

  Website: https://www.csuchico.edu/regenerativeagriculture/index.shtml

  Contact: Cynthia Daley, cdaley@csuchico.edu

- **Measurement, Reporting and Verification at the Global Level**—Issue an RFP for a multi-stakeholder workshop designed to develop a global, open source platform for MRV to facilitate ambitious national commitments on mitigation and adaptation related to soil carbon sequestration and healthy soils. This workshop could explore existing MRV models, the potential for nations to establish their own systems, and design of a global platform that could also facilitate private ecosystem service payments and supply chain payments to farmers and ranchers practicing climate smart agriculture.[54, 55]

  Contact: Betsy Taylor, betsy@breakthroughstrategiesandsolutions.com

Possible Barriers to Overcome

- Longstanding norms in the academic community that reward narrowly defined research projects often with minimal application in the real world.
- Research procedures and protocols with limited application to integrated land-use systems as they are practiced by smallholder farmers in the tropics, the major practitioners of agroforestry systems.
- Significant funding to academic experts from vested industrial agricultural interests. Finding scientists who are independent of these interests is key.

Change Lever Four: SUPPLY CHAINS

Global and regional food and fiber supply chains offer many opportunities for leveraging positive changes in agricultural and soil health practices. How food and fiber are sourced, packaged, and ultimately distributed are critical factors for the health of our soils, rural communities, and climate.

There are two overarching trends in this field. One is focused on shifting global food and fiber chains and agricultural practices in a positive direction and the other on building local and regional food and fiber systems—detaching in part from the global export markets.

Globally, the action has been with major companies and their farm and consumer partners. General Mills is advancing regenerative agriculture[56] through its natural and organic brands, including Annie's, which has a strong push for organic, regenerative practices. It has produced a regenerative agriculture scorecard[57] to help guide the work. DANONE includes soil carbon sequestration in the company's Climate Neutrality Commitment.[58] Large food companies are looking at everything from warehousing and transportation to actual production practices as a way to reduce emissions and promote carbon drawdown through farming. On July 12, 2018, four major food companies formed the Sustainable Food Policy Alliance.[59] These four withdrew from the Grocery Manufacturers Association in the United States and are developing financial incentives for farmers to enhance nutrition, reduce emissions, and transition to low-carbon alternatives in the entire food system. OriCoop[60] in Australia is driving change by partnering with farmers, workers, investors, and consumers to promote organic and soil carbon sequestering practices. Certification systems are being developed to ensure standards for production.[61,62] Intermediary non-profit groups[63] help address the whole chain of production to facilitate change.

Many groups are building resilient local food systems and regional markets with community supported agriculture and help from organizations like Community-Wealth.org, FoodPrint, National Sustainable Agriculture Coalition, and others.

FACING *Uncertainties*

The amount of carbon that can be sequestered globally is a matter of debate, reflecting differences in assumptions about soil carbon storage processes, how widely carbon-enhancing interventions can be practiced (scalability), depth of soil affected, and exclusion of new and promising data sets from IPCC models. Part of the difficulty is that monitoring soil carbon often requires at least five years to detect significant changes. Along with methane from cattle and rice and nitrous oxide from fertilizers, CO_2 from soils is a major agricultural by-product. The potential of soil carbon sequestration is constrained by government subsidies to damaging agricultural practices and in some cases by the costs or risks for farmers in transitioning to climate smart practices. Further, a majority of extension agents worldwide are trained in practices not consistent with increasing soil organic matter, rather than regenerative agriculture methods, inhibiting transformation. Research suggests that storing carbon deeper in soil, in part through perennial and deep-rooted crops, could increase the sequestration potential and may provide more resilience from soil carbon losses. These crops hold great promise, but there may be limits especially as soils warm due to rising global temperatures. These and other challenges must be faced forthrightly, yet this remains a no regrets investment pathway that helps bolster food security, water retention, and biodiversity as well as resilience and climate mitigation.

Some are also focusing on sustainable production of fibers like wool and cotton grown using regenerative practices which can be used to develop locally manufactured climate friendly textiles for regional consumption.[64] New food and fiber systems with the promise of reduced emissions and carbon drawdown can contribute to climate mitigation, rural development, and adaptation.

Priorities for Philanthropic Support

- **Consumer Demand** — Underwrite projects and diverse networks of stakeholders seeking to organize increased consumer demand for climate-friendly food and fiber products through procurement, consumer organizing, and strategic communications. Combine this with global food chain campaigns that place pressure on global agribusiness and consumer brands to leverage changes in their supply chains.
- **Local Food and Fiber Systems** — Invest in local and regional food and fiber systems where producers, consumers, investors, and technical experts are already connected and working cooperatively to build new systems and reward agroecological practices from the ground up.
- **Priority Supplier Nations** — Consider greater engagement with NGOs in India, China, Brazil and Indonesia, among others. We must partner with global and local NGOs seeking to influence supply chains and production in priority regions.
- **Certification and Labeling** — Underwrite certification programs to verify that adopted practices are effective, durable, and achieving multiple benefits for people and the planet. Help increase consumer awareness and demand for labeled products.

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

- **Sustainable Food Lab**—This non-profit helps bring diverse stakeholders together to explore systemic shifts in food chains that will benefit food system workers, consumers, producers, and our climate with a focus on whole system analysis. It influences and partners with major buyers of agricultural products and has worked on coffee, cocoa, eggs, grains, and the agricultural practices supporting our food system.

  Website: https://sustainablefoodlab.org/

  Contact: Hal Hamilton, hhamilton@sustainablefood.org

- **Carbon Farming Innovation Network**—A program of Green America's Center for Sustainability Solutions, the network catalyzes innovations in large complex supply chains, aligning representatives from each sector—farmers, researchers, finance, technical assistance, and brands/buyers—to take actions that accelerate agricultural carbon sequestration and improvements in soil health.

  Website: http://www.centerforsustainabilitysolutions.org/carbonfarming/

  Contact: Erin Gorman, EGorman@greenamerica.org

- **Fibershed**—Fibershed develops regional and regenerative fiber systems on behalf of independent working producers, promotes carbon farming, and rebuilds regional manufacturing of natural fibers. Climate beneficial textiles produced through regenerative practices are gaining public policy and consumer attention in several states and with ecologically minded retail clothing stores.

  Website: https://www.fibershed.com/

  Contact: Rebecca Burgess, harvestingcolor@gmail.com

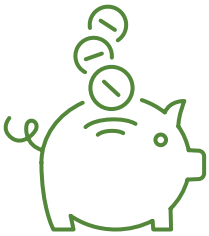
Possible Barriers to Overcome

- Most of the companies trying to drive demand are not demonstrating a sufficient interest in risk sharing with farmers and ranchers. In food production today, at least in the U.S. context, the risk all flows down to the farmers.
- Crop insurance and farm subsidies are skewed primarily to very large corporate farms growing corn, wheat and soybeans. This uneven playing field and lack of support to farmers working to diversify their systems makes transition extremely difficult.

"Fibershed is one of the most dynamic and exciting organizations around because they are working at all levels of the supply chain, connecting carbon in the soil to the end consumer in direct and cyclical ways. They partner with producers of wool, hemp, cotton, and other fibers and with textile designers, buyers, and multinational clothing companies. By promoting regenerative practices in fiber production, they support climate friendly clothing and textiles while promoting healthy soils."

—Kevin Boyer, Executive Director, Regenerative Agriculture Foundation

Learn more at http://fibershed.org



Change Lever Five:
FINANCE

"We will need all the leadership, all the science and engineering, all the effort, and all the luck we can muster to win this race. It really is the race of our lives."

— Jeremy Grantham, Co-founder and chief investment strategist, Grantham, Mayo, & van Otterloo

Philanthropic investors are uniquely positioned to help catalyze the economic drivers that will advance healthy soils and take soil carbon sequestration to scale. One of the biggest barriers to farmer adoption of regenerative techniques is the added costs and risks in changing any given practice. Climate smart agricultural practices often lead to reduced farm revenues for an initial transition period. So financial incentives, not just information and tools, are very important for moving the field forward at the farm and landscape level, though there is debate over how long and under what conditions financing is needed.

Money is needed for rapid action at the project level but also at the national and global scale. The role of philanthropy and impact investing is to help advance financing models, policies, strategic communications, and early money for initiatives that show promise of scaling this field quickly.

Finance often comes from governments, so policy is vital for improving capital flows. Denmark is spending one billion U.S. dollars to promote conversion to organic agriculture and to send farm advisers into the field.65 Too often, policies moves finance in the wrong direction. The U.S. Farm Bill and the EU Common Agricultural Policy are widely critiqued for the subsidies of industrial farming methods that often undermine soil health and rural livelihoods. Reform of these sweeping policies and subsidy programs is as important as creating new finance flows for regenerative practices.

At a national and global level, less developed and developing nations need financial help for technologies, training, and transitional support to help their agricultural sectors become more resilient and climate smart. To help, philanthropy could develop partnerships with large financial entities like the Green Climate Fund, World Bank, International Fund for Agricultural Development, the International Finance Corporation, and related development banks and agencies.[66]

Aside from government, where is the money to come from to support farmers making the transition to carbon farming? Most scenarios for sourcing payments to farmers are rooted in assumptions about robust carbon markets. There are many soil carbon projects and demonstration farms in the world, but only a handful of these are participating in the voluntary carbon markets and standards. Carbon offsets can be effective in some contexts.[67] At the same time, offsets as a primary decarbonization strategy are being challenged. Still, several groups are pushing to use carbon credits and markets to advance the field.[68] Revenue from cap & trade and other carbon pricing mechanisms can provide farm payments as reflected in the California Healthy Soils Program (HSP), which derives funding not from carbon offsets but from regulatory payments by industry into a greenhouse gas fund that is under the control of the

legislature and Governor. The HSP Incentives Program provides financial assistance for implementation of conservation management practices that improve soil health, sequester carbon, and reduce greenhouse gas emissions.[69]

Global food companies are another source of funding for farmers making the transition to climate smart practices. Several global food companies are structuring bonus payments to their farm suppliers for use of regenerative practices that build soil and sequester carbon,[70] and many universities, hospitals, large NGOs, and local governments are using the power of their food purchasing dollars to shift production processes to promote regenerative practices.

Green bonds have been the subject of increasing government, corporate, and investor interest, driven by the mainstream acceptance of sustainable investing and the prospect of matching large low-carbon investment requirements with the trillions of dollars in global bond markets held by institutional investors.[71, 72] Most green bonds to date have been directed to renewable energy infrastructure but there is growing interest in using bonds to help promote ecological restoration of native forests, prairies, and grasslands and to promote regenerative agriculture. Philanthropy can fund advocacy to create green bond and green bank mechanisms for agriculture.[73]

Foundations can play a direct role in supporting farmers who need access to low-interest capital for purchase of equipment, seeds, and organic fertilizer. Consider investments in low-interest revolving loan funds, like Root Capital in Africa or the Land O'Lakes revolving loan fund, which is targeted at three diverse geographic regions in the United States to encourage climate smart agriculture. Philanthropy can also help by funding the establishment of ecosystem service payment schemes.[74]

Two years ago, governments pledged $300 million for the Land Degradation Neutrality Fund with a focus on protection and restoration of soil organic carbon to soils. Philanthropy can support NGOs working to leverage these funds for healthy soils and climate mitigation and adaptation. The Global Environment Facility, Green Development Fund, and Green Climate Fund are looking anew at land-based investments, particularly in developing nations.[75] The World Bank has a longstanding program—the Bio-carbon Fund—tilted more towards forests than agriculture but with results-oriented payments for land-based carbon sequestration projects. The U.S. based National Institute on Food and Agriculture also releases funds primarily for research. Philanthropy can help influence the types of programs that receive these funds.

More recently, equity, impact, and ag-technology investors are working on deals to scale the field. Private investment is not at the scale needed to tackle the problem. There needs to be a paradigm shift in the way in which private sector investors view investment opportunities in regenerative agriculture and in how philanthropy and government policies catalyze private capital. See page 37 for impact investing opportunities.

REFLECTIONS ON *Finance and Market-based Solutions*

Are market-driven strategies the primary path to rapid transformation and sustainable development? Are positive green business initiatives dwarfed by market-based norms and structures that do damage? Under what circumstances are profit-seeking ventures likely to solve problems and when are they diversions from the real work at hand? Fierce ideological attachments to opposing perspectives are at the heart of many policy and financing debates. When it comes to soils, it is no different. Aligning financial mechanisms, including procurement, with core values such as divestment from fossil fuel or in support of new markets for climate beneficial food and fiber is critical. Yet the true environmental and social costs of our dominant, commodity-based food system are not internalized in market signals. We have trillions in cash circling the planet looking for high returns, including in the land and food sector—but what will those investments add up to if we exceed planetary tipping points in the next two decades? As we secure more financing to help nations, rural communities, and farmers shift to climate smart practices, we must pay close attention to how markets do and don't catalyze transformation.

Financial prizes sometimes catalyze change and provide funding for farmers. A growing number of agencies and foundations are offering prizes to spur progress and provide financing to innovators in the field.[76, 77] And finally, strategies that help farmers create additional on-farm funding flows are useful. For instance, the Soil Health Academy supports farm income diversification with stacked profit centers; these encourage the creation of value-added goods linked to regenerative agriculture.

Priorities for Philanthropic Support

- **Leverage Public and Private Funds** — Foundation grants can help unleash finance for nations and landscape level initiatives, focusing on some of the agencies, banks, and large funding entities that can invest at scale. Philanthropy could develop an advocacy campaign focused on major funding for nations that need help in transitioning to regenerative agriculture.
- **Change Subsidies** — Redirecting existing subsidies is a priority — away from practices that damage soils and soil carbon and towards practices that restore our soils. This is a political fight.
- **Maximize Impact** — We need a donor network and pooled fund to help philanthropic groups collaborate and maximize the impact of their funds.
- **Land Conservation Funding** — Increasing funding and financing for land conservation remains a priority. If we don't conserve farmland and rangeland from development, we lose. We must work to secure public and private funds for land conservation. It is critical to ensure that land is conserved in ways that ensure equitable land access and financing for new, young, women, indigenous, and historically disadvantaged farmers and that land practices are truly regenerative and sustainable.

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

- **Public and Private Capital for Conservation of Working Lands**—American Farmland Trust, The Nature Conservancy, Conservation International, and many local land trusts are longstanding land conservation groups working to secure additional public and private finance for land conservation. Preservation of farmland is a prerequisite for regenerative practices. American Farmland Trust focuses on saving farmland within the United States with a range of financing tools. The Nature Conservancy and Conservation International are playing a role globally assessing a range of financing options tied to public and private capital.[78]

  Website: https://www.nature.org/en-us/

  Contact: Deborah Bossio, deborah.bossio@tnc.org

  Website: https://www.conservation.org/Pages/default.aspx

  Contact: Shyla Raghav, sraghav@conservation.org

  Website: https://www.farmland.org/

  Contact: Jen Moore-Kucera, jmoorekucera@farmland.org

- **The Center for Good Food Purchasing**—This organization led a networked partnership of local and national institutions toward leveraging procurement dollars from large public institutions to secure nutritious, humanely produced, climate-friendly food, through the Good Food Purchasing Program. After program adoption by Los Angeles school district in 2012, produce purchases of $12 million annually were redirected to the local food economy, creating more than 220 well-paying food chain jobs. The Center is now working with 28 enrolled institutions across the country, including Chicago and New York. Together, these institutions spend nearly $1 billion on food each year. building demand for food produced in sustainable, equitable, and regenerative ways.

  Website: https://goodfoodpurchasing.org/

  Contact: Alexa Delwiche, adelwiche@goodfoodpurchasing.org

Possible Barriers to Overcome

- Complexity in financing schemes. Many of the market-based schemes are mired in language and concepts that remain inaccessible to many players in the field. From trading schemes to offsetting protocols, we sometimes make things too complicated.
- Institutional competition that sometimes precludes collective action on financing at the global and national level.
- Failure of those most influential in controlling and directing finance to grasp the urgency of the climate and food security crisis and the need to invest in practices that can quickly reduce emissions and strengthen resilience, including SCS.

Change Lever Six:
COMMUNICATIONS

We need strategic communications to ignite interest and action from critical stakeholders, including farmers, public officials, international negotiators, consumers, and private sector leaders. Change won't happen if key actors don't have the information and motivation required.

There has been surprisingly little media coverage of land-based solutions to climate change. This needs to change.

Priorities for Philanthropic Support

- **Communicate the Potential**—Communications focused on the potential of land-based solutions for addressing the climate threat.
- **Success Stories**—Positive success stories that chronicle the many co-benefits of building healthy soils. These stories of success must be shared with influential decision makers as well as farmers to spark more interest and investment in the field. Create an interactive platform for success stories.
- **Influential Messengers**—Invest in influential speakers and presentations that can be shared to engage investors and policy makers at the highest levels.

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

- **One Earth Campaign**—This global initiative launched by the Leonardo DiCaprio Foundation is concentrating on disseminating critically important messages on nature-based solutions across multiple channels including social, video, TV, radio, and print media. This campaign is designed to enlist greater public and movement engagement in support of action. It is working with a group of major social media influencers in 10 regions with a collective reach of 750 million people.

  Website: https://www.leonardodicaprio.org/

  Contact: Karl Burkhart, karl@ldcfoundation.org

- **Kiss the Ground**—This California based non-profit has the ambitious goal of increasing soil carbon & biodiversity on 500 million acres of land by 2050. It has championed creative storytelling about healthy soils with videos, infographics, photos, a book, stories, blogs, and a speaker training course. Strategically, Kiss the Ground's communications are focused on educating youth, empowering businesses, and building consumer demand that supports regenerative practices. They are launching a nationwide tour with the release of the official Kiss the Ground documentary that includes raising money for a scholarship fund to support training and technical support for farmers.

  Website: https://kisstheground.com/

  Contact: Lauren Tucker, lauren@kisstheground.com

- **Project Drawdown**—Led by Paul Hawken, this non-profit is savvy about communicating the potential of regenerative agriculture. Their efforts to reach influential business, government, and NGO leaders have already helped raise awareness and hope about the potential of soil carbon sequestration and other climate solutions. They have several efforts underway to communicate the potential of healthy soils to cool the planet.

  Website: https://www.drawdown.org/

  Contact: Paul Hawken, paul@drawdown.org

Possible Barriers to Overcome

- Communications strategies ideally should be embedded within larger strategic goals focused on policy, finance, and scaling the field. Communications in a vacuum won't achieve the results we need.
- Soil carbon sequestration can be a fairly technical concept. Communication strategies must present content that is accurate, inspiring, and understandable.
- Messengers and messages in one location may not resonate in another.

Change Lever Seven:
NETWORKS

"Agroecological practices are fundamental to soil health. Groundswell International works with partner organizations in Africa, Asia, and Latin America that promote agroecological practices with farmers as key agents of change. Collaborating with action-researchers, farmers develop techniques that enable them to produce crops and manage their land in response to climate change by enhancing soil fertility and carbon sequestration."

— Jen Astone, Executive Director, Swift Foundation

Learn more at http://groundswellinternational.org

Information alone seldom sparks action. Rapid change in agricultural systems depends on networks of diverse and innovative groups and leaders working collaboratively with trust, respect, and shared visions.[79] This requires investment in leaders, retreats and conferences, and in hubs or nodes populated by highly capable, small teams of people whose role is to support the larger field of work. There are many examples of successful networks.[80, 81]Ultimately, transformation is rooted in diverse and strong relationships among key stakeholders in a system. Too often, most groups tend towards sameness (of assumptions about how change happens, what soil practices are best, what policies will work, who should be at the table). We need cross-fertilization of networks through fellowships, internships, and travel grants — for young academics, farmers, soil carbon experts, and NGO leaders. Senior experts on soil health need support for graduate students and young mentees and interns.

The world is in a continuous state of flux. Highly adaptive networks built on deep relationships can navigate this constant change. Network science shows that the quantity, quality, and diversity of a leader's relationships predicts how innovative they will be. This field is rapidly growing and we need smart collaborative efforts to push it forward.

Priorities for Philanthropic Support

- **Open Source Platform** — An open source platform for knowledge and data sharing — a platform designed with multiple functions and with user friendly onramps.
- **Leadership Networks** — Place-based and global networks of diverse stakeholders.
- **Youth Leaders and Networks** — Young leaders are key to change. Support efforts that empower young farmers, policy experts, investors, NGO leaders and academics to share knowledge and build strong relationships for ongoing collaboration.
- **Women as Change Agents** — Women have a unique role to play and building networks of women leaders focused on healthy soils is a priority.[82] Research by UN Women, UN Environment, and the World Bank shows that empowered women make things happen. Women are the backbone of many rural communities, especially in developing countries. They make up almost half of the world's farmers. The primary caregivers to families and communities, women provide food and nutrition; they are often the human link between the farm and the table.[83]
- **Strategic Retreats** — We need action-oriented gatherings of innovative and diverse stakeholders working to scale this field. Consider funding strategic retreats with farmers, policy makers, NGOs, investors, and business leaders at the regional, national and global level. Support a gathering of key stakeholders promoting perennial crops globally or one focused on sustainable intensification of agriculture in tropical nations.

Funding Opportunities: Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

- **4 per 1000 Initiative**—This is a leading global network promoting regenerative agriculture. It helps provide coordination of research programs, communicates success stories, and organizes briefings to pull global stakeholders together at key conferences.

  Website: https://www.4p1000.org/

  Contact: Paul Luu, paul.luu@4p1000.org

- **The Global Soil Health Challenge**—This is a global network of engagement for nations and sub-national governments. Announced by California and France at the Global Climate Action Summit in San Francisco (September 2018), signatories agree to promote the development of healthy soils and report back on their progress at upcoming climate meetings of the UN. Founding members also include the "4 per 1000" Initiative, The Nature Conservancy, Under2 Coalition, and Point Blue Conservation Science. This network is developing an inventory of existing policy and market initiatives, mapping and engaging with relevant actors, and convening to help states and regions promote soil health strategies within their climate action plans.

  Website: https://frenchfoodintheus.org/4004

  Contact: Jenny Lester Moffitt, jenny.lestermoffitt@cdfa.ca.gov

- **Regeneration International**—RI works with multiple stakeholders in key regions of the world to accelerate regenerative agriculture. They have built on-the-ground alliances and partners in South Africa, India, Mexico, Guatemala, Belize, Canada, Zimbabwe, Myanmar, Uruguay, Argentina, New Zealand, Australia and in the Midwest region of the United States. RI partners closely with 4 per 1000.

  Website: https://regenerationinternational.org/

  Contact: Andre Leu, andreleu.al@gmail.com

- **The No Regrets Initiative**—This Initiative is dedicated to the health of agricultural soils and agricultural communities in North America and works to leverage human, financial and ecological capital. Paicines Ranch Learning Center (PRLC) is part of No Regrets and works to educate, inspire and connect people with new ideas and networks that advance soil health. Some of the PRLC's current programming includes learning journeys to inspire funders to integrate regenerative principles into their decision-making; convenings for landowners to reimagine their land; educational workshops for farmers, ranchers and other practitioners; and communities of practice for women in ranching.

  Website: http://www.noregretsinitiative.com/

  Contact: Megan Mendenhall, megan@paicinesranch.com

Possible Barriers to Overcome

- We may face competing hubs and a proliferation of efforts to coordinate the field.
- Some hubs become bureaucratic and slow-moving. We need speed.

GAME-CHANGING STRATEGIC INITIATIVES

We need transformation. Scaling this field poses challenges. Incremental changes and improved efficiencies are not sufficient given the magnitude of the challenges we face. The following suggested campaigns integrate multiple levers for change in focused strategic initiatives. They seek multiple co-benefits. Some involve research, policy, and coalition building while others focus on unified campaigns in critical geographies. All are ripe for next steps.

Game Changer #1: Waste to Compost

There's a colossal amount of waste in the world from our food and fiber systems. We must reduce food waste and harness the rest of the waste to feed soil. By converting much of this waste into compost, we can have a positive impact on soil fertility, water retention, and soil carbon sequestration while reducing the need for synthetic fertilizers. About one-third of the 1.3 billion tons of food produced globally each year is wasted. This food waste is responsible for an estimated 4.4 gigatons of greenhouse gas emissions annually.[84] Of the 100 top solutions to climate change identified by Project Drawdown, reducing food waste was number three.[85] Higher-income countries waste almost as much food annually as the entire net food production of sub-Saharan Africa.[86] At the same time, management and storage of livestock manure are responsible for more than half a gigaton of greenhouse gas emissions annually.[87] Developed nations in particular must cut food waste and shift to more plant-based diets. If we capture the remaining food, agricultural, and animal waste as compost and repurpose it to build healthy soils, we will triple our impact—reducing greenhouse gas emissions from food and animal waste, capturing carbon through soil carbon sequestration, and creating a source of revenue.[88] The Ellen MacArthur Foundation has estimated that implementing this type of circular economy opportunity in India could yield billions per annum in material savings by 2050.[89] We need a global campaign that integrates research, waste management policies, farmer engagement, communications, and supply chains.

Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix I.

- **University of California/Berkeley—Compost—A Game Changer**—Dr. Whendee Silver at University of California/Berkeley is completing 10-year field trials on compost application and soil carbon sequestration. The initial results are extremely positive. This is a double bottom line strategy—by removing food and agricultural waste from the waste stream we reduce methane and when the resulting compost is applied to fields, it boosts plant growth (a boon for farmers and ranchers) and soil carbon sequestration (a boon for slowing climate change). Funds are needed to process and analyze the final 10th year samples collected this summer, to integrate these data into global models, and to make public the results of the research.

  Contact: Whendee Silver, wsilver@berkeley.edu

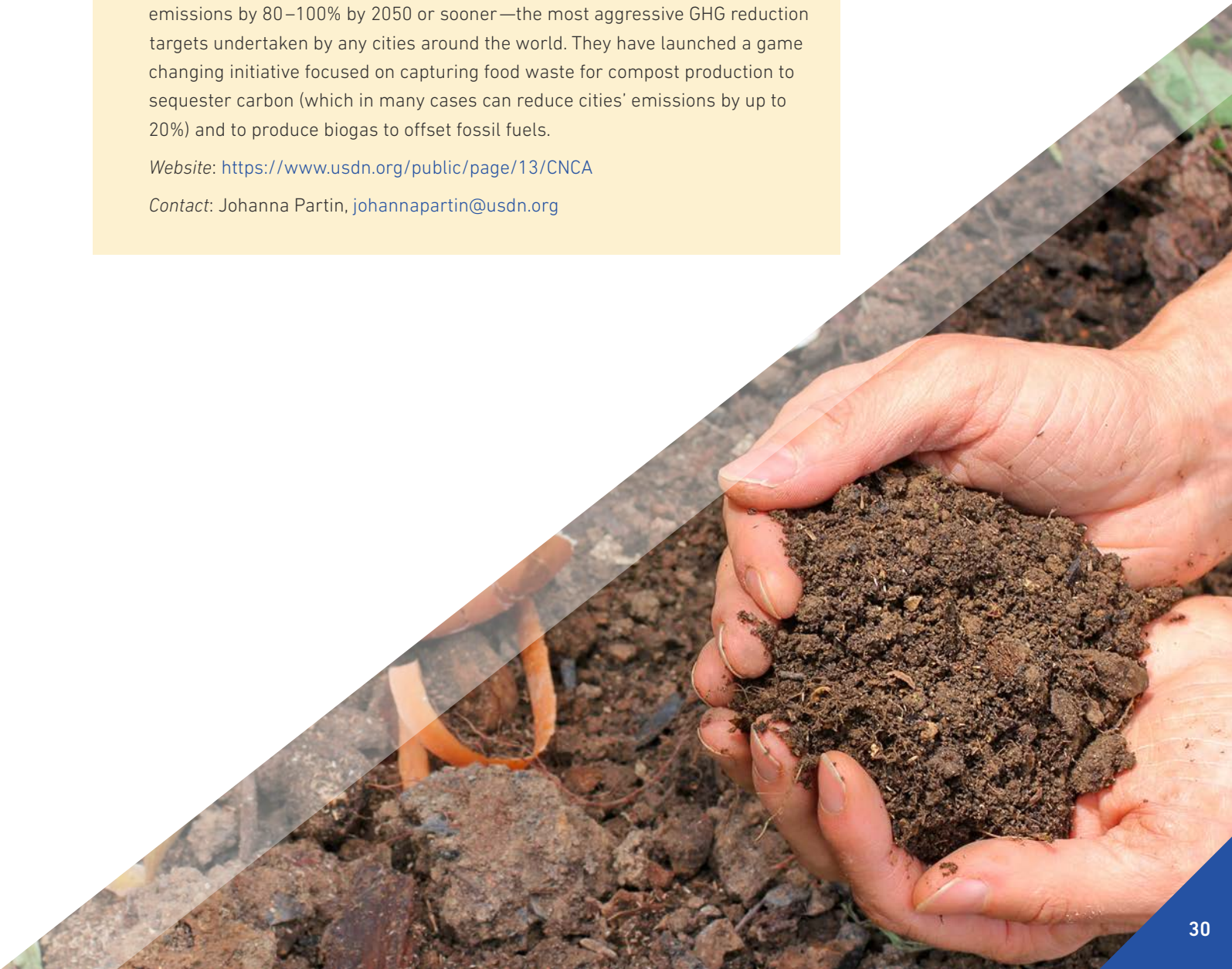
- **Carbon Neutral Cities Alliance**—The Carbon Neutral Cities Alliance (CNCA) is a collaboration of leading global cities working to cut greenhouse gas emissions by 80–100% by 2050 or sooner—the most aggressive GHG reduction targets undertaken by any cities around the world. They have launched a game changing initiative focused on capturing food waste for compost production to sequester carbon (which in many cases can reduce cities' emissions by up to 20%) and to produce biogas to offset fossil fuels.

  Website: https://www.usdn.org/public/page/13/CNCA

  Contact: Johanna Partin, johannapartin@usdn.org

"The Better Tomorrow Fund is proud to support the work of Dr. Whendee Silver and her efforts to demonstrate the many positive impacts of composting to build healthy soils and boost soil carbon."

—Betsy Taylor, Philanthropic Adviser, Better Tomorrow Fund/Vanguard Charitable Foundation



Game Changer #2: Geographic Hotspots

We need investment in key geographic areas where teams of soil health experts, NGOs, government extensions services, and others are already in the field partnering with networks of farmers and ranchers in support of regenerative practices. This approach is built on the theory of diffusion of change through early adopters.[90] Efforts are already underway to target areas with the highest potential for SCS and for retaining already sequestered carbon. Foundations can underwrite healthy soils pilot programs at landscape scale in up to twenty regions or nations; focus on securing baseline soil, water, and yield data and demonstrating multiple co-benefits associated with carbon sequestration and healthy soil practices within five years. There are several regions within the United States and around the world where dynamic research/action networks are moving forward. These front runner regions need early support as a way to demonstrate the benefits of healthy soil practices and the potential for soil carbon drawdown in different contexts. By getting baseline data, monitoring practices, and verifying results, we can begin to scale successful approaches. We do not have a final list of these target areas. Deeper mapping of the field is required. Here are a few critical geographies. For a more extensive, though not exhaustive list. see Appendix III of our online guide.

Solutions in Action

- **California**—California Climate and Agriculture Network has a long track record of advancing sustainable agricultural practices to promote climate resilience and mitigation. This group works with a host of other critical organizations including the California Department of Food and Agriculture, Carbon Cycle Institute, Nature Conservancy, and most recently, the California Air Resources Board which together are advancing robust goals for carbon removal through land-based strategies. California continues to help lead the world in advancing healthy soils to cool the planet.

  Website: http://calclimateag.org/

  Contact: renata@calclimateag.org

- **Colorado** — Mad Agriculture — Colorado has a host of groups working to advance carbon farming, including Mad Ag, The Nature Conservancy, Savory Institute, Holistic Management Institute, National Young Farmers Coalition, NRCS, and soil carbon experts at Colorado State and University of Colorado. Groups are working to restore an agrarian culture among farmer networks and to promote policies, practices, soil carbon monitoring, financing models and job development. With outstanding soil carbon research teams in Colorado's state universities and interest from state government, Colorado is on the move.

  Website: http://www.madagriculture.org/

  Contact: Philip Taylor, philip@madagriculture.org

- **Montana** — Carbon 180 — This carbon removal NGO is working with multiple stakeholders and partners in Montana and other western states to secure action in partnership with farmers, policy leaders, research teams, technical support teams, and key aligned stakeholders. All primary stakeholders need funding to ensure success. They are gathering baseline data about their soils, monitoring climate safe practices in the field, and building support for policies that will provide incentives for healthy soils and soil carbon sequestration.

  Website: https://carbon180.org/

  Contact: Jane Zelikova, jane@carbon180.org

- **New Mexico** — Climate Change Leadership Institute — This quick-moving coalition has assembled diverse stakeholders in support of healthy soils policy and practices. In addition, the Western Landowners Alliance and NM Association of Conservation Districts are proposing an Agriculture and Natural Resource Trust Fund, which would provide long-term, dedicated funding to help farmers and ranchers implement changes in grazing management and crop production practices to conserve soil and water, improve vegetation, and better support wildlife habitat. Quivira Coalition is working on a carbon ranching pilot and partnering with others to establish the NM Coalition to Enhance Working Lands. NM is a hotbed of activity.

  Website: http://www.takeresponsibility.us/HSI/NM-SHI.pdf

  Contact: ccli@takeresponsibility.us

- **Belize** — Regeneration International (RI) — RI has convened a large network of Belize smallholder farmers in support of regenerative practices. Researchers from local and international universities including Ohio State are partnering with local NGOs and farmer networks. There is strong momentum for change.

  Website: https://regenerationinternational.org/

  Contact: Andre Leu, andreleu.al@gmail.com or henry.anton.peller@gmail.com

GEOGRAPHIC
Targets

Geographic targets must be selected based on multiple criteria including both high carbon landscapes (where big losses of carbon can be avoided) and areas ripe for rehabilitation (for the highest gains in SCS). Targeting should look at the whole system: the potential for soil carbon sequestration, the scale of food insecurity, the presence of ambitious and capable stakeholders working collaboratively, strong commitment and interest from farmers, widespread commitment to the sustainable development and social justice dimensions of the projects, potential for government engagement, and access to as well as comparative need for funding. More in-depth analysis is needed to apply these and other metrics based on soil organic data but equally on the presence of dynamic and diverse leadership networks. Our team did not have the bandwidth to conduct a comprehensive global landscape analysis and prioritization. Instead, we sought input from many stakeholders and have showcased some of those high momentum geographies in Appendix III in the online version of this guide. There are other very critical hotspots, particularly outside of the United States, and we encourage debate on where funds should be directed, given the need to move very quickly and wisely with limited resources.

Game Changer #3: Peatlands

About 14–20 % of peatlands in the world are currently used for agriculture. For agricultural use, fens and raised bogs have to be drained in order to regulate the air and water conditions in the soil to meet the requirements of cultivated or pasture plants. In many European countries, GHG emissions from agricultural peatlands dominate national emissions of GHGs from peat sources.

Source: Peatlands and Climate Change, International Peatland Society

Some soils matter more than other soils when it comes to our climate. Peatlands are critical wetlands that form rich, organic soil produced by accumulation of partially decomposed plant material formed over thousands of years. Peatlands cover an estimated 3% of the Earth's land surface yet their soil carbon content is immense. Most are in the northern hemisphere, covering large areas in North America, Russia and Europe. Tropical peatlands occur in mainland East Asia, Southeast Asia, the Caribbean and Central America, South America and southern Africa.[91] Together, these peat-rich soils support biodiversity and store between 530 to 694 billion tons of carbon globally. Agriculture, forestry and peat extraction for fuel and horticultural use are the major causes of peatland disturbance.

About 14–20% of peatlands in the world are currently used for agriculture and the great majority of these are used as meadows and pastures. For agricultural use, fens and raised bogs have to be drained in order to regulate the air and water conditions in the soil to meet the requirements of cultivated or pasture plants. In many European countries, GHG emissions from agricultural peatlands dominate national emissions of GHGs from peat sources.[92]

In some parts of the world, peatlands are releasing vast amounts of carbon due to fire. Peatland in Indonesia and Malaysia has been used for agricultural expansion, particularly of oil palm, as fertile land becomes increasingly scarce. When peatland is cleared for palm oil plantations, the peat wetlands must be drained, releasing CO_2 into the atmosphere. Peatlands are responsible for 42% of Indonesia's total greenhouse gas emissions. A global strategic campaign must pull together peat-related companies, targeted governments, community leaders, and NGOs to address policies, practices, and communications to peat-burning households.[93] Protecting peatlands through enforcement of regulations against burning and drainage is imperative. The FAO and numerous scientific bodies have prioritized high carbon lands for conservation and restoration. These lands could potentially release huge quantities of greenhouse gas emissions if further developed and conversely can be a pathway to resilience and critical carbon storage if properly conserved.[94] Recent studies show that when peatlands are rewetted and restored, they return to providing carbon drawdown services, pulling greenhouse gas emissions back into the land.[95] More work is needed on adapting agriculture for peatlands (paludiculture) as there are land use conflicts around many of the world's peatlands and these communities need food and fuel security. The David & Lucile Packard Foundation has played an important role in this sector.

Solutions in Action

- **International Union for Conservation of Nature**—The IUCN Peatland Initiative and IUCN UK Peatland Programme are raising awareness to effect positive change in management of these soils. One of their most influential on-the-ground partners, RSPB, is working to protect the single largest expanse of blanket bog in the world.

  Website: https://www.iucn.org/

  Contact: Clifton.Bain@iucn.org.uk

- **The Global Peatlands Initiative** is galvanizing communications and public outreach by celebrities and pairing this with solid science and education to effect change. They have prioritized outreach to influential policy and business leaders.

  Website: https://www.globalpeatlands.org/

  Contact: Maria.Nuutinen@fao.org

The conversion of forest and peatland to palm oil plantations in Indonesia is currently the largest global source of land use greenhouse gas emissions.

Source: David and Lucile Packard Foundation

Game Changer #4: Ecological Restoration and Green Infrastructure Investments

Currently, one third of agricultural lands have been severely degraded.[96] Meanwhile, one third of global protected land is under intense human pressure for development with tens of billions of dollars of proposed infrastructure investments. This land development will put more pressure on all species, the climate, water, and on food production. Many organizations are working to influence infrastructure investments to restore rather than further damage habitat and natural ecosystems. Others are working to restore and protect our wildest lands by working with those who live on the ground.[97] In the midst of heated debates over growth, livelihoods, population, food security, and biodiversity, there is new momentum for ecological restoration and green infrastructure investments that might advance carbon sequestration, job opportunities, and climate solutions. The new focus on a Green New Deal within the United States and in the UK is opening new possibilities for land restoration and carbon farming. There are opportunities[98] to thwart ecologically destructive development plans and replace them with green infrastructure initiatives that will create jobs and promote ecological restoration.[99, 100] There is an immediate opening to promote a land sector program within the emerging Green New Deal plan in the United States. Many "just transition" organizations are involved, historically with a focus only on the energy sector, but now with an embrace of carbon drawdown and rural development through working lands. This is a huge agenda but one that demands more attention, both to restore degraded lands[101] and to integrate land restoration into conventional infrastructure proposals.

Solutions in Action

For a more extensive and periodically updated list of funding opportunities see Appendix IV of our online guide.

- **Nia Tero** — Nia Tero is working to secure indigenous community protection of our last wild places globally, including critical tropical forests that need protection from expansive commodity agriculture. This is one of the largest and most ambitious ecological restoration groups in the world, aligned with indigenous communities.

  Website: https://www.niatero.org/

  Contact: Chris Filardi, cfilardi@niatero.org

- **Sunrise** is a youth-led organization in the United States that has successfully advanced a proposal for a Green New Deal,[102] a program of investments that include transitioning from fossil fuels and restoration of forests and lands. It has partnered with Data For Progress, a group that has formulated a preliminary green infrastructure design incorporating land restoration. It is also partnering with a think tank, New Consensus, to add details to the plan. These groups are providing much of the youth-led support and communications in support of major public/private investments to transition from fossil fuels and draw down carbon through our forests, grasslands, and farms.

  Website: https://www.sunrisemovement.org/

  Contact: Will Lawrence, lawrence.will@gmail.com

  Website: https://www.dataforprogress.org/green-new-deal/

  Contact: Sean McElwee, seanadrianmc@gmail.com

- **Society for Ecological Restoration (SER)** is the leading international organization working on the science, practice, and policy of ecological restoration, with members in 70 countries. SER advances ecological restoration to sustain biodiversity, improve resilience in a changing climate, and re-establish an ecologically healthy relationship between nature and culture.

  Website: https://www.ser.org/

  Contact: James Aronson, james.aronson@mobot.org

Game Changer #5: Irrigated Rice

Rice is a staple food for nearly half the world's people. Global rice production must increase to meet the world's growing needs for food. Yet rice production is a huge source of methane and nitrous oxide. Managing for water, residue, tillage & nutrients can provide effective mitigation of carbon emissions from rice paddies.[103, 104, 105] System of Rice Intensification is an emerging smallholder-focused strategy to improve soil health and conserve water.[106, 107] The Organic and Fair Trade Rice Project links small rice farmers in India and Thailand with buyers in Switzerland and works to protect soil and reduce emissions.[108] Drainage regimes have shown promising results for reducing methane emissions but more work is needed. There is conflicting research about the best interventions for rice production.[109] A game-changing global campaign might start with a convening of key stakeholders already advancing best practices and policies. Given the scope of impact on food, climate and water systems, this area warrants greater focus from philanthropy. Philanthropy could underwrite a gathering of innovative researchers, business leaders and farmers working across diverse landscapes to explore best practices and the latest technologies. Our team learned enough to recognize that innovations with irrigated rice production are in the works and that these are absolutely essential for food security and climate mitigation. We have included this as a game-changer, but more analysis is required.

Impact Investing

To scale and make progress quickly, we must bring all the tools in our toolbox to this challenge. The soil carbon sequestration field needs significant resources—and ideally those resources will go beyond traditional philanthropic grants to include impact investment dollars—which offer the opportunity to bring more capital to the space. Such investments can take various forms and range from low-cost debt to equity in related startup companies. While impact investments offer the possibility of return of capital (and possible additional returns), they obviously carry varying levels of risk, including the potential loss of all invested capital.

Suggested Guidelines:

We'd like to start off with some guidelines. First, offered by Tony Lovell of SLM Partners in a podcast with Koen van Seijen:[110]

- Investors should be clear as to why they are considering regenerative agriculture and what role it will play in their portfolio. Are they looking for diversification, to own a real asset, etc. and **is that reason stable enough to last a decade or more?**
- Investors should ensure there is alignment between their investment horizon and the time it takes to do the work on the land. While some conventional agriculture may be able to force the land to produce quickly, **regenerative agriculture takes time.**

In addition, we concur with these guidelines offered by Nuveen/TIAA, in their 2017 report: Responsible Investment in Farmland.[111] Comments in italics are our own. Agricultural investments should:

- Promote environmental sustainability (*including investments that help ultimately rebuild healthy soils and sequester carbon*)
- Respect labor and human rights
- Respect existing land and resource rights (*including for indigenous groups that often own land collectively*)
- Uphold high business and ethical standards
- Produce regular reports on progress toward implementing these guidelines

Resources on Impact Investing and Regenerative Agriculture

Several entities have been working to advance impact investing in regenerative agriculture. We recommend investors interested in this space consult the resources below. For periodically update additional resources see Appendix V.

- **Confluence**—Confluence Philanthropy advances mission aligned investing. It supports and catalyzes a community of private, public and community foundations, individual donors, and their values-aligned investment advisors. Most recently it has added a focus on regenerative agriculture and is partnering with the Sustainable Agriculture and Food System Funders, a critical network of foundations and individual philanthropists. https://www.confluencephilanthropy.org/
- **Delta Institute**—This group published a report Valuing the Ecosystem Service Benefits from Regenerative Agriculture Practices supported by a USDA Conservation Innovation grant. https://delta-institute.org/
- **Impact Investing in Sustainable Food and Agriculture Across Asset Classes: Financing Resilient Value Chains through Total Portfolio Activation; May 2017**—This comprehensive 36-page guide, crafted by seven significant players including Trillium Asset Management, discusses options for investing in sustainable agriculture by various asset classes (cash equivalents; fixed income; public equity; private equity/VC; real assets). http://www.trilliuminvest.com/wp-content/uploads/2017/05/Investing-in-Sustainable-Food-and-Agriculture.pdf
- **No Regrets Initiative**—This initiative works to galvanize philanthropic, impact investment and social capital in support of healthy soils and regenerative agriculture. http://www.noregretsinitiative.com/what-do-i-do-now/

A CAUTIONARY *Note*

While we list a range of investment options, nothing in our roster of investment opportunities should be taken as a specific investment recommendation. We simply aim to share information on ideas and projects we've encountered that individual (largely accredited) impact investors or foundations with an interest in mission- or program-related investments may want to further explore. We recommend you consult an investment advisor before making any investment. Investments mentioned vary in their structure, their risk, and their liquidity.

The projects listed have not in all cases rigorously demonstrated that their efforts have sequestered additional carbon in the soil. But they (or at least a portion of an effort or fund) are engaged in practices known to build carbon and healthy soils. We'll also note that the field of regenerative agriculture and soil carbon sequestration is rapidly growing and evolving, with new players, resources, initiatives and opportunities coming onboard often. These are our current top recommendations, but the field is moving rapidly.

Soil Health Investment Opportunities

Here is a short list of possible investment opportunities related to soil health. For additional updated recommendations see Appendix VI.

- **Farmland LP**—A sustainable farmland investment company, Farmland LP buys commodity farmland and works to add value by securing organic certification, investing in infrastructure, and increasing crop diversity. Currently offering a Vital Farmland REIT investment opportunity for accredited investors only; $50,000 minimum.

  Website: http://www.farmlandlp.com/

- **Iroquois Valley Farmland REIT**—Iroquois Valley Farmland REIT, a Public Benefit Corporation and Certified B-Corporation, has a ten-year history of deploying private investment capital to secure land for independent organic farmers. Investment opportunities include REIT Equity Shares which offer direct ownership of a diversified portfolio of organic farmland, and Soil Restoration Notes, a fixed income product that has an additional financial benefit to organic farmers transitioning the soil. Currently, both investment opportunities are available to accredited investors only, but the Company will launch a new Equity Offering in January, 2019 that will allow any investor to purchase stock (REIT Equity Shares) with a minimum investment amount of $10,000.

  Website: https://iroquoisvalley.com/

  Contact: invest@iroquoisvalleyfarms.com

- **PastureMap**—Bay area-based startup whose mission is to help farmers and ranchers make profits building healthy grasslands. Pasture Map's product (currently in use by thousands of ranchers) is an online software platform to help land managers map lands, manage rotational grazing, and track extensive data related to land and herd performance. Currently have a convertible note open (in advance of anticipated upcoming Series A).

  Website: https://pasturemap.com/

  Contact: Christine Su, CEO, christine@pasturemap.com

- **Propagate**—Propagate is a new venture focused on integrating fruit and nut trees into farm operations to increase carbon capture and soil health. It is a relatively new, but very interesting model. Silvopasture—the integration of trees into pasture and farming operations—is one of the most promising carbon drawdown practices.

  Website: https://www.propagateventures.com/

  Contact: Ethan Steinberg, ethan@propagateventures.com

- **Root Capital**—Root Capital a non-profit social investment fund operating in poor rural areas of Africa, Latin America, and Southeast Asia. Donors can make low-interest loans to a revolving loan fund in support of small holder farmers providing products to major food companies worldwide. This group is beginning to prioritize soil carbon sequestration.

  Website: https://rootcapital.org/

  Contact: Willy Foote, wfoote@rootcapital.org

- **RSF Social Finance**—RSF has both a Food System Fund and a Regenerative Economies Fund—these funds have a $100k minimum and PRI level returns. They also have a Social Investment Fund that only has a $1k minimum—Food and Agriculture is one of the fund's focus areas (the others are Education and Ecological Stewardship). This group is acting with urgency and is focused on genuine transformation of our food and agricultural systems.

  Website: https://rsfsocialfinance.org/

  Contact: Amy Beck, amy.beck@rsfsocialfinance.org

Possible Barriers to Overcome:

- Many investment opportunities exist in private equity/private debt space, which can present challenges related to timing (a given fund may only be open to investment for a limited window); liquidity; access to information (some have restrictions on public advertising), and minimum investment size required. Many are only open to accredited investors.
- Margins in agriculture are generally low; some feel it is unrealistic to expect additional or significant returns for investors who are not the farmers themselves.
- Regenerative farms may still be tied to commodity (esp. organic commodity) markets, which are highly volatile and becoming more so with climate change.
- In some cases, agriculture may only be a segment of what a fund invests in. Similarly, not all investments overtly measure/assess their impact on soil health and carbon. Each investor must decide if the alignment with their goals appears strong enough.
- Earlier stage direct investments may require substantial follow-on investment over time to achieve breakeven. [Investors need to consider their capacity for follow-on before taking on a new investment].
- The space is relatively new so there are few entities with proven a track record of success.
- It takes time for regenerative agriculture to rebuild the soil. Capital needs to be patient.
- Agricultural investments face challenges that include water access, drought, and increasing climate change impacts. (Though regenerative agricultural practices aim to lessen or increase resilience in the fact of these impacts/threats, they still exist).

Concluding Reflections

What does our future look like? Day to day patterns of life create an illusion that things are normal, but we know on some deep level that things are out of sync. For hundreds of millions of people, the crisis has already arrived in the form of food insecurity, devastating weather events, and degraded landscapes. According to the world's leading climate scientists, humanity has just over a decade to get carbon emissions under control before catastrophic climate change impacts become unavoidable. At the same time, food insecurity and the need to adapt to inevitable climate impacts require more attention. We must act now. Building soils and supporting regenerative agriculture offer immense benefits and will enhance resilience. Few investment pathways are more urgent or important. Let us not succumb to a failure of imagination. Donors and our grantees must prepare for unexpected openings in the political and economic landscape. In the United States, in the wake of the 2008 global financial crisis, over $80 billion dollars were speedily invested into clean energy infrastructure helping to spur the rapid adoption of electric vehicles, wind, and solar power. Today, foundations can make investments to build the field's momentum while preparing to scale up when unexpected openings occur. The Earth is full of wonder and enchantment. Our soils are precious and life-giving. We must awaken to the astonishing and complex world beneath our feet and act to stop the rapid destruction of so many living systems. Thank you for your efforts to ensure a healthy and safe future for all. We welcome feedback, criticisms, and ambitious proposals for how to move ahead with speed and success.
Please contact us at info@breakthroughstrategiesandsolutions.com

For additional resources and grantmaking opportunities see the Appendix.

For more information about Breakthrough Strategies and Solutions and our work on soil carbon sequestration, go to https://breakthroughstrategiesandsolutions.com

To send feedback on this guide, send a message to
info@breakthroughstrategiesandsolutions.com

Endnotes

1 www.breakthroughstrategiesandsolutions.com/soilguide

2 https://www.scientificamerican.com/article/only-60-years-of-farming-left-if-soil-degradation-continues/

3 https://www.vox.com/2018/10/8/17948832/climate-change-global-warming-un-ipcc-report

4 https://www.wri.org/blog/2018/10/8-things-you-need-know-about-ipcc-15-c-report

5 https://www.usda.gov/media/blog/2015/05/12/hedge-against-drought-why-healthy-soil-water-bank

6 https://worldpolicy.org/2017/12/12/to-ensure-food-security-keep-soils-healthy/

7 https://www.adb.org/publications/large-scale-soil-health-restoration-food-security

8 http://drdaphne.com/article/the-surprising-healing-qualities-of-dirt/

9 http://www.fao.org/in-action/action-against-desertification/en/

10 http://www.globalharvestinitiative.org/2017/12/worldsoilday-soil-health-boosts-incomes-and-education-in-india/

11 http://www.anthropocenemagazine.org/2018/03/regenerating-soil-can-double-corn-farmers-incomes/

12 https://www.chelseagreen.com/product/dirt-to-soil/

13 https://www.sciencedirect.com/book/9780128012314/land-restoration

14 http://www.fao.org/soils-2015/news/news-detail/en/c/281917/

15 https://www.goodreads.com/book/show/6528761-nature-s-matrix

16 http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=25259

17 https://www.wri.org/blog/2018/12/wanted-325-million-federal-rd-jumpstart-carbon-removal

18 https://www.pnas.org/content/114/44/11645

19 http://advances.sciencemag.org/content/2/5/e1501639?intcmp=trendmd-adv; http://science.sciencemag.org/content/329/5993/834.full

20 https://www.unenvironment.org/news-and-stories/press-release/rapid-and-unprecedented-action-required-stay-within-15oc-says-uns

21 https://mahb.stanford.edu/library-item/deep-adaptation-map-navigating-climate-tragedy/

22 https://www.unenvironment.org/news-and-stories/press-release/rapid-and-unprecedented-action-required-stay-within-15oc-says-uns

23 These milestones assume a greater reduction in emissions and drawdown potential associated with agroforestry, including silvopasture, as well from compost applications, and perennial and deep rooted crops than some of the recent estimates have incorporated.

24 http://www.mission2020.global/milestones-alternative-energy/#landuse

25 https://www.pnas.org/content/114/44/11645

26 http://www.fao.org/docrep/019/i3671e/i3671e.pdf

27 https://www.drawdown.org/solutions

28 This field only moves forward if the business case for farmers and ranchers is strong. The entire strategy depends on the enduring engagement of those who care for the land.

29 Climate Mitigation and Adaptation Goals must be joined with Sustainable Development Goals; https://unfccc.int/achieving-the-sustainable-development-goals-through-climate-action

30 Many groups report that farmers enter this field less around climate mitigation and more frequently with a desire to improve productivity or livestock value, reduce the cost of chemical inputs, and to manage for water. https://onlinelibrary.wiley.com/doi/full/10.1111/sum.12401

31 Some proposed soil carbon sequestration practices have raised concerns about unintended but very harmful impacts. This is primarily related to Bioenergy with Carbon Capture and Storage (BECCS) and market based protocols that might displace indigenous and small land holders or create a playing field only relevant to export commodity agricultural players. See here for an excellent overview-https://carbonmarketwatch.org/publications/26618/

32 http://www.pnas.org/content/114/36/9575

33 https://pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/2904/2904-1291/2904-1291_pdf; https://www.ruralnewsgrhttp://www.fao.org/soils-portal/en/ oup.co.nz/rural-news/rural-management/farmers-learning-from-other-farmers

34 https://www.adb.org/sites/default/files/publication/386056/sewp-16.pdf

35 Foundations and donors should collaborate in partnership with groups such as the NDC Partnership, World Resources Institute, the 2050 Pathways Platform, the Carbon Neutrality Coalition, and the Food and Land Use Coalition to support a process and outcome that facilitates NDC ambition on agriculture.

36 http://www.fao.org/soils-portal/en/

37 https://www.theatlantic.com/business/archive/2015/04/how-corporate-lobbyists-conquered-american-democracy/390822/ http://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf#view=fit&pagemode=none

38 http://iurd.berkeley.edu/uploads/Economic-Contribution-Report-White-Paper.pdf

39 http://nas-sites.org/dels/studies/cdr/

40 https://www.4p1000.org/sites/default/files/content/consortium_3-4_-_4p1000_research_priorities_from_stc_0.pdf

41 https://www.4p1000.org/sites/default/files/content/consortium_3-4_-_4p1000_research_priorities_from_stc_0.pdf

42 https://www.washingtonpost.com/news/energy-environment/wp/2018/01/22/a-technology-many-hoped-would-fight-climate-change-would-cause-even-bigger-environmental-problems-scientists-say/?utm_term=.fe699bd889df

43 https://www.frontiersin.org/articles/10.3389/fenvs.2017.00041/full

44 http://comet-planner.com/

45 http://cometfarm.nrel.colostate.edu/

46 https://www.frontiersin.org/articles/10.3389/fenvs.2017.00041/full

47 Land Degradation Surveillance Framework; AIFOREARTH.com, INRIC,

48 van Wesemael, B., K. Paustian, O. Andrén, C.E.P. Cerri, M. Dodd, J. Etchevers, E. Goidts, P. Grace T. Kätterer, B. McConkey, S. Ogle, G. Pan and C. Siebner. 2011. How can soil monitoring networks be used to improve predictions of organic carbon pool dynamics and CO2 fluxes in agricultural soils? Plant and Soil 338:247-259

49 https://futureoffood.org/wp-content/uploads/2017/10/FoodHealthNexus_Full-Report_FINAL.pdf; https://soilhealthinstitute.org/wp-content/uploads/2018/10/Soil-Health-Human-Health-Conference-Program-digital4.pdf

50 http://carbonfarmingsolution.com/

51 https://www.researchgate.net/publication/227001056_Carbon_Sequestration_in_European_Agroforestry_Systems

52 https://academic.oup.com/aob/article/114/8/1571/210078

53 http://carbonfarmingsolution.com/

54 https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2486.2012.02689.x

55 Breakthrough Strategies is exploring this informally with a range of stakeholders including Dr. Peter Smith at University of Aberdeen and Keith Paustian at Colorado State.

56 https://www.generalmills.com/en/Responsibility/Sustainability/Regenerative-agriculture

57 https://www.annies.com/wp-content/uploads/2018/05/General-Mills-V1.0-RA-Scorecard.pdf

58 https://www.danone.com/impact/planet/towards-carbon-neutrality.html

59 https://www.foodbusinessnews.net/articles/12142-nestle-danone-mars-and-unilever-form-sustainable-alliance

60 https://organicinvestmentcooperative.com.au/

61 https://www.prnewswire.com/news-releases/rodale-institute-dr-bronners-patagonia-and-others-to-unveil-regenerative-organic-certification-at-natural-products-expo-west-2018-300608053.html

62 https://agreenerworld.org/

63 https://sustainablefoodlab.org/webinar-series-how-to-climate-proof-your-coffee-supply-chain/

64 https://www.washingtonpost.com/business/the-dirty-secret-about-your-clothes/2016/12/30/715ed0e6-bb20-11e6-94ac-3d324840106c_story.html?noredirect=on&utm_term=.b64f357c484a

65 https://www.organicconsumers.org/news/denmarks-government-spend-billion-organic-farming

66 https://unfccc.int/topics/climate-finance/resources/multilateral-and-bilateral-funding-sources

67 https://nativeenergy.com/

68 https://www.nature.org/content/dam/tnc/nature/en/documents/Carbon-Market-Incentives-Report.pdf

69 https://www.cdfa.ca.gov/healthysoils/

70 https://www.generalmills.com/en/Responsibility/Sustainability/Regenerative-agriculture

71 http://www.valoral.com/wp-content/uploads/2017-12-21-Global-AgInvesting.pdf

72 https://www.nrdc.org/sites/default/files/greencitybonds-ib.pdf

73 https://greenbanknetwork.org/about-gbn/

74 The Noble Institute has an advanced effort underway in the United States. ALUS in Canada has a system in place.

75 https://www.greenclimate.fund/-/gcf-taps-private-sector-power-in-inaugural-climate-conference

76 Ag-Results is offering a prize for sustainable rice production models in Vietnam. Venture Capital firm S2G has launched Foodshot, a $500,000 prize for moonshots to build healthy soils www.foodshot.org

77 https://www.worldfuturecouncil.org/p/2018-agroecology/

78 https://www.nature.org/content/dam/tnc/nature/en/documents/Carbon-Market-Incentives-Report.pdf

79 https://www.socialvelocity.net/2015/10/15/the-network-approach-to-social-change/

80 https://www.usdn.org/home.html?returnUrl=%2findex.html

81 http://www.networkimpact.org/clients-and-cases/#iin

82 http://www.ifpri.org/publication/womens-empowerment-agriculture-index

83 http://www.worldbank.org/en/news/feature/2017/03/07/women-in-agriculture-the-agents-of-change-for-the-food-system

84 http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf

85 https://www.drawdown.org/solutions/food/reduced-food-waste

86 http://exponentialroadmap.futureearth.org/wp-content/uploads/2018/09/Exponential-Climate-Action-Roadmap-September-2018.pdf

87 http://www.fao.org/news/story/en/item/197623/icode/

88 https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/12-0620.1

89 https://www.forbes.com/sites/suparnadutt/2017/06/21/this-startup-is-making-indias-garbage-its-business/#7a5475fd5512

90 http://www.comminit.com/global/content/diffusion-innovation-theory-s-curve

91 http://www.peatsociety.org/sites/default/files/files/PeatlandsandClimateChangeExecutiveSummary.pdf

92 Peatlands and Climate Change, International Peatland Society

93 https://www.unenvironment.org/news-and-stories/story/protecting-peatlands-protecting-planet

94 https://www.nature.com/articles/s41467-018-03406-6

95 https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.14449

96 https://www.theguardian.com/environment/2017/sep/12/third-of-earths-soil-acutely-degraded-due-to-agriculture-study

97 https://www.niatero.org/

98 https://www.dataforprogress.org/green-new-deal/

99 https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1526-100X.2006.00136.x

100 https://www.re-generationfestival.com/

101 https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1526-100X.2006.00136.x

102 https://www.vox.com/energy-and-environment/2018/12/21/18144138/green-new-deal-alexandria-ocasio-cortez

103 https://www.sciencedirect.com/science/article/pii/S0378429018303976

104 https://www.downtoearth.org.in/news/rice-fields-as-carbon-sinks-44964

105 https://ccafs.cgiar.org/publications/effective-mitigation-greenhouse-gas-emissions-rice-paddies-without-compromising-yield#.W-x6Z9VKiM8

106 http://sri.ciifad.cornell.edu/

107 https://sriwestafrica.files.wordpress.com/2018/04/sri-waapp-book-single-p-8mb.pdf

108 https://www.helvetas.org/en/switzerland/what-we-do/how-we-work/our-projects/asia/india/india-thailand-fair-and-good-for-people-and-planet

109 https://www.mdpi.com/2071-1050/10/12/4424

110 https://soundcloud.com/investinginregenerativeagriculture

111 https://www.tiaa.org/public/pdf/06-2017_GBR-CFARMRPT_Farmland_Report.pdf

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Appendix I — ADDITIONAL GRANTMAKING OPPORTUNITIES

FARMER TO FARMER PROGRAMS

United States

Rodale Institute
This well-known demonstration farm and training center provides cutting edge support to farmers and other stakeholders dedicated to organic and regenerative agriculture. Funders could support Rodale's efforts to train both land managers and farm extension experts.

Website: https://rodaleinstitute.org/
Contact: Drew Smith, andrew.smith@rodaleinstitute.org

Southeastern African American Farmers Organic Network (SAAFON)
The Down-South AfroEcology Training School (DATS) is designed to strengthen the agroecology movement within the United States through the engagement and education of Black farmers in the Southeast region who are either currently farming organically, seeking to transition to organic practices, or are seeking to gain access to farmland.

Website: http://www.saafon.org/
Contact: Yvette Brown, (920) 372-2366

Savanna Institute
This Midwest institute provides training and workshops for farmers interested in incorporating agroforestry and perennial crops into their farm systems.

Website: http://www.savannainstitute.org/
Contact: Kevin Wolz, kevin@savannainstitute.org

International

Groundswell International

Groundswell International helps create farmer field schools and facilitates farmer to farmer learning in support of agroecological and regenerative practices.

Website: https://www.groundswellinternational.org/
Contact: Steve Brescia, sbrescia@groundswellinternational.org

Grassroots Trust Zambia

This NGO provides training programs for farmers with a focus on holistic management of animals, low-input regenerative cropping systems, and regeneration of trees through pruning. They include conferences, communications and training in their programs and receive high marks from several international NGOs.

Website: http://grassrootstrust.com

Amalima,

Amalima supports women farmers and women's empowerment as a crosscutting component of the program. It improves household food security and nutrition by strengthening access to and availability of food and helps women farmers in building their soil and soil carbon. This project is part of a larger association[1] of groups working on sustainable rural development.

Website: https://www.cnfa.org/program/amalima/

Amrita Bhoomi

This farmer training program is based in southeast Asia and supports small holder farmers working to promote agroecological practices. It serves as a La Via Campesina agroecology school in South Asia and is a member of the Zero Budget Natural Farming movement. The group is working to replicate the regenerative farming practices of Andhra Pradesh — an initiative converting production practices of 500,000 farmers in that state.

Website: https://amritabhoomi.org/
Contact: Phone: +91 91487 33004

Las Cañadas

Heralded by Eric Toensmeier, author of The Carbon Farming Solution, as the best training farm in the tropical world. This farm has been cited by numerous experts and farmers as a source of deep indigenous wisdom and a demonstration of what is possible. Investments to help the farm expand its reach and training programs in Mexico could have significant ripple effects.

Website: https://www.greenbiz.com/article/farm-grows-climate-change-solution

Farmer Field Schools

These schools are promoted and nurtured by FAO and the International Fund for Agricultural Development (IFAD) and designed with a participatory pedagogy. The program has already graduated over twelve million small farmers. A growing number of farmer field schools are advancing soil carbon sequestration as well as efficient water irrigation, support for women and young farmers, improved food security, and holistic approaches to local farming systems.

Website: http://www.fao.org/farmer-field-schools/en/

Better Soils Better Lives

This is a start-up initiative based in Malawi and focused on advancing green manure cover crops in Africa through farmer to farmer outreach and training in numerous African countries where hunger is a growing

[1] https://orapzenzele.org/cgi-sys/suspendedpage.cgi

threat. Green manure/cover crops help sequester carbon, conserve moisture, reduce soil erosion, and provide additional sources of income and food.

Website: http://www.fao.org/family-farming/detail/en/c/290995/
Contact: Roland Bunch, rbunchw@gmail.com

POLICY

United States

National Sustainable Agriculture Coalition:
NSAC is a leading force for agricultural policy reform in the United States. It supports advocacy by farmers and rural stakeholders in opposition to harmful subsidies and in support of healthy soils, a just and healthy food system, and soil carbon sequestration. This group has prioritized the Environmental Quality Incentives Program (EQIP), the Conservation Stewardship Program (CSP), and the Grasslands Initiative - all key tools that should be leveraged to support sustainable land management strategies.

Website: http://sustainableagriculture.net/
Contact: Ferd Hoefner, fhoefner@sustainableagriculture.net

Carbon 180
This group is fostering and supporting multi-stakeholder campaigns in several western states to help move policy frameworks and demonstration projects on soil carbon sequestration through agriculture. By creating coalitions with local governments, NGOs, academics, and farmers, Carbon 180 is working to explore federal policy options for catalyzing soil carbon storage at scale.

Website: https://carbon180.org/
Contact: Noah Deich, noah@carbon180.org

Union of Concerned Scientists
UCS has prioritized work that includes promoting regenerative agriculture research and supporting agroecology and healthy soils policies, as key elements in the path toward a healthier food system. They have advocated for Farm Bill programs that include critical research and conservation programs, such as the Conservation Stewardship Program at the U.S. Department of Agriculture. They are also exploring a range of other federal policy opportunities.

Website: https://www.ucsusa.org/
Contact: Marcia DeLonge, MDeLonge@ucsusa.org

Institute for Trade and Agricultural Policy
IATP looks at healthy soils through policy and trade negotiations. Its work on soil carbon and healthy soils is in the larger framework of advocacy for food safety, worker rights, and environmental protections, particularly in trade agreements.

Website: https://www.iatp.org/
Contact: Ben Lilliston, BLilliston@iatp.org

World Resources Institute
WRI is conducting broad analysis of policy options, at the national and state levels, that could help scale the field and advance land-based solutions to the climate threat. It is supporting state policy leadership through the Natural & Working Lands Challenge by providing technical assistance and identifying supportive policy

measures at the federal level. WRI is also providing technical assistance and support for land restoration projects in Africa.

Website: https://www.wri.org/
Contact: James Mulligan, James.Mulligan@wri.org

International

World Future Council
The World Future Council seeks philanthropic partners for its program to reward governments and sub-national entities adopting innovative policies to promote agroecological practices. Partnering with WFC to focus their awards more specifically on agroecology and soil carbon sequestration is an option.

Website: https://www.worldfuturecouncil.org/

RESEARCH

United States

The Quick Carbon Project
This low-cost protocol for rapidly measuring soil carbon across large landscapes at fine spatial resolutions is a program of the Yale School of Forestry and Environmental Studies. The inexpensive nature of this methodology lends land managers the ability to look at impacts of management decisions on below-ground carbon at the landscape scale — a key for soil carbon assessment. Funds are needed to perfect the tool and to develop an open source platform for its distribution and use.

Website: https://www.quickcarbon.org/
Contact: Dan Kane - daniel.kane@yale.edu

International

CGIAR and ISRIC
These two leading global agricultural research and mapping hubs have proposed a workshop to synthesize knowledge on effects of sustainable land management interventions on soil organic carbon. The overall aim of this work is to identify successful practices, especially the consistency of their impacts in different settings, the level of their impact and the degree of uncertainty. The proposed workshop would provide information about the scope of data available and get buy-in from the participating scientists. The next step would be to compile, analyze, and share the data.

Websites: https://www.cgiar.org/ and https://www.isric.org/
Contact: Lini Wollenberg, Lini.Wollenberg@uvm.edu

Mapping Soil
The Nature Conservancy, the International Soil Reference and Information Centre (ISRIC), and Vizzuality are partnering to develop a prototype for a global web-based platform for dynamic soil organic carbon mapping. There will be functionality to develop project baselines and monitor progress. This could contribute to setting priorities for soil carbon projects as well as helping with monitoring changes in soils over time and increasing confidence for investors in the field. The first country targeted for application of the prototype is Argentina.

Websites: https://www.isric.org/, https://www.nature.org/en-us/
Contact: Deborah Bossio — deborah.bossio@tnc.org

Agroecological and Soil Health Learning Stations in the Tropics
Build soil health & crop diversity learning stations with existing farmers associations in key geographic regions throughout the tropical world. (See below for more on key geographies.) The primary grant recipient for coordinating this work needs to be determined. Partner with the longest-established and best-performing peasant associations in the tropical world such as UNAG Nicaragua (50 thousand members) and Bharatiya Kisan Union (20 million members in India) and critical agroforestry research institutes like CATIE in Costa Rica. Build experimental research stations attached to the farmers associations. Research focus is on cover crops, agroforestry, compost applications, perennial crops, and improved grazing practices. Conduct long-term, landscape-scale field research to verify the sequestration of carbon and improvement of soil health in small-holder tropical farming contexts. This proposal emerged from our interviews and seems primed for leadership. By focusing on sustainable intensification in the tropics with a priority on smallholder agroforestry, huge gains might be made to stem deforestation while improving food security and sequestering carbon in soils. This effort could be lodged with CATIE, https://www.catie.ac.cr/ in Costa Rica or World Agroforestry Centre, http://www.worldagroforestry.org/. For further consultation on this concept, contact Henry Anton Peller, henry.anton.peller@gmail.com.

Partnering with the UN, Governments, and International Organizations to Advance the Field
Major international agricultural research networks and organizations are ramping up to address soil carbon sequestration, including the CIRCASA project (Coordination of International Research Cooperation on Soil Carbon Sequestration in Agriculture), the Global Soil Partnership supported by FAO, Global Research Alliance on Agricultural Greenhouse Gases (GRA), and the CGIAR, among others. The Global Soil Partnership works with nations to improve healthy soils and to advance soil carbon sequestration for mitigation and adaptation. They are currently updating a global soils map, coordinating regional partnerships in support of healthy soils in the developing world, and helping nations address soil erosion and soil pollution. CIRCASA is led by France's INRA to organize research and knowledge exchange regarding carbon sequestration in agricultural soils at European Union and global levels. The GRA has organized a soil carbon network to advance soil carbon research. CGIAR is a network of fifteen research centers with a presence in over seventy countries that sustains partnerships with governments, NGOs, universities, private companies, and UN agencies. Philanthropy can partner and help underwrite particularly strategic research to leverage dollars at a global level.

Website: https://www.cgiar.org/how-we-work/strategy/
Contact: Lini Wollenberg, Lini.Wollenberg@uvm.edu

Website: http://www.fao.org/global-soil-partnership/en/

Contact: Ronald Vargas, ronald.Vargas@fao.org

SUPPLY CHAINS

United States

Noble Research Institute
The Noble Research Institute in Oklahoma is launching the Ecosystem Services Market (ESM) program — a multi-stakeholder effort to connect food and beverage companies with regenerative farmers and ranchers

to reward positive practices that provide measurable ecosystem benefits for carbon, water, and biodiversity habitat.

Website: https://www.noble.org/
Contact: Bill Buckner, wbuckner@noble.org

The Climate Collaborative
This group is organizing the natural products supply chains to address climate change. The collaborative promotes regenerative agriculture and fiber production and other climate beneficial practices.

Website: https://www.climatecollaborative.com/
Contact: Erin Callahan, info@climatecollaborative.com

Main Street Project
This poultry-centered regenerative agriculture project in Minnesota works to build consumer demand, new markets, and healthy food products that promote soil carbon sequestration while also lifting immigrant farm workers out of poverty. It owns a 100-acre demonstration farm dedicated to a just transition from industrial agriculture to regenerative agriculture, working closely with local consumers, producers and farm workers.

Website: https://mainstreetproject.org/
Contact: Julie Ristau, jristau@mainstreetproject.org

Perennial Farming Initiative:
This California-based initiative is galvanizing chefs in support of healthy food from healthy soils. They are sending a message to their diners that eating is an agricultural act, and that food produced by regenerative farmers is a way of creating positive change in the world. They are involved with an innovative carbon credit program linking restaurants with farmers/ranchers to support regenerative farming practices.

Website: http://perennialfarming.org/
Contact: karen@theperennialsf.com

International

World Wildlife Fund
WWF has a long history of working with supply chains to shift forestry management. It is also partnering with global food companies to press for changes in agricultural practices. It works primarily with large commodity crop producers to encourage conservation practices.

Website: https://www.worldwildlife.org/
Contact: Martina Fleckenstein, mfleckenstein@wwfint.org

Conservation International:
CI works to mitigate the role of agriculture as a driver of deforestation while also advancing policies and practices to promote climate smart agriculture. It partners with local producers and global companies to promote rural livelihoods, food security, and conservation of land. More recently it has promoted soil carbon sequestration as part of its programming.

Website: https://www.conservation.org/what/pages/climate.aspx
Contact: Shyla Raghav, sraghav@conservation.org

COMMUNICATIONS

United States

Carbon Farming Solution

Eric Toensmeier is one of the most effective and knowledgeable communicators about the details of soil carbon sequestration and in particular about the promise of agroforestry. His presentations are accurate, up-to-date and compelling. He combines communication with deeper briefings on agroforestry opportunities. A fiscal sponsor is able to accept charitable donations in support of Eric's outreach.

Website: http://carbonfarmingsolution.com/
Contact: Eric Toensmeier, toensmeier@gmail.com

Carbon Underground

This entrepreneurial group develops outreach campaigns to influential sectors including celebrities, professional sports teams, and food supply chain companies. They weave together advocacy, communications, and global stakeholder convenings.

Website: https://thecarbonunderground.org/
Contact: Larry Kopald, lkopald@thecarbonunderground.org

Civil Eats

This daily news service provides critical thought about the American food system. It publishes stories that help its readers understand the need to address equity, social justice, farmer welfare, and ecological health through our agriculture policies and programs. A grant could be made earmarked to integrate soil carbon sequestration into their holistic coverage of the food system.

Website: https://civileats.com/
Contact: Naomi Starkman

Food and Farm Communications Fund

This is a funder collaborative focused on advancing positive stories and communications strategies about regenerative and socially just farming systems in the United States.

Website: https://foodandfarmcommunications.org/

Soil Centric

This relatively new non-profit is launching an interactive platform that will help individuals and activists plug into regenerative agriculture through a web platform offering videos and a range of public engagement opportunities.

Contact: Diana Donlon, ddonlon415@gmail.com

International

Nature4Climate
Nature4Climate is a new campaigning vehicle which is supported by a multi-stakeholder coalition. Its purpose is to use strategic communications to drive action on natural climate solutions. It works to lift up the stories of success and the voices from government, the land, and from business. Driven by the Nature Conservancy, N4C is focused on communications to influential decision makers and audiences. Much of N4C's focus in on forestry, but a grant could be earmarked for communications and outreach on agriculture and soils.

Website: https://nature4climate.org/
Contact: Lucy Almond, lucy.almond@tnc.org

NETWORKS

United States

Agree
The AGree Initiative at Meridian Institute serves as a hub and network for a range of stakeholders working to improve US food and agriculture policy. Meridian plays the role of convener and helps move processes along through selected initiatives.

Website: http://www.merid.org/en/Content/Projects/AGree_Transforming_Food_and_Ag_Policy.aspx
Contact: Deborah Atwood, datwood@merid.org or Todd Barker, TBarker@merid.org

Soil Carbon Project/Sustainable Markets Foundation
This is the fiscal sponsor for much of the strategic leadership provided by Breakthrough Strategies & Solutions in support of healthy soils and soil carbon sequestration. This team supports a global list serve dedicated to scaling soil carbon sequestration, a domestic list serve supporting healthy soils policy development, and a range of strategic convenings, briefings, and communications to build the field.

Website: www.breakthroughstrategiesandsolutions.com

Contact: Austin Badger, austin@breakthroughstrategiesandsolutions.com

International

Africa Center for Holistic Management
This Savory Institute hub supports a network of organizations and ranchers working to promote holistic management of grazing livestock.

Website: http://www.africacentreforholisticmanagement.org/
Contact: Jody Butterfield, jbutterfield@savory.global

The Alliance for Food Sovereignty in Africa:
AFSA is a hub and network of agricultural networks in Africa. It is a broad alliance of different civil society actors that are part of the struggle for food sovereignty and agroecology in Africa. These include: African farmers' organizations, African NGO networks, specialist African NGOs, consumer movements in Africa, international organizations which support the stance of AFSA, and individuals. Its thirty official member organizations represent smallholder farmers, pastoralists, hunter/gatherers, indigenous peoples, faith-based institutions, and environmentalists from across Africa.

Website: https://afsafrica.org/home/what-is-afsa/
Contact: Million Belay, millionbelay@gmail.com

Holistic Management International

HMI serves a global network of farmers and farm communities dedicated to restoring the land and rural communities. It provides training programs, consumer education and outreach, and support to local policy makers.

Website: https://holisticmanagement.org/
Contact: Anna Adams, anna@holisticmanagement.org

La Via Campesina

They are a global network of small farmers and indigenous groups working for land rights, agroecological farming practices, and humane and just food systems for agricultural workers.

Website: https://viacampesina.org/en/
Contact: Juan Reardon, juan.reardon@viacampesina.org

RARE

RARE offers a global platform and supports smallholder farmers in Africa, Asia, and Latin America. It has global and local partners and works to promote regenerative agriculture to ensure food security and protection of biodiversity.

Website: https://www.rare.org/en-farming-biodiversity
Contact: Dale Galvin, dgalvin@rare.org

Soils for Life

This non-profit helps support over 100 stakeholders promoting regenerative practices in Australia.

Website: http://www.soilsforlife.org.au/home/index.html
Contact: Wendy Button, Wendy.Button@pmc.gov.au

Sustainable Food Trust

SFT works to accelerate the transition to more sustainable food and farming systems in the United Kingdom. It has worked to promote regenerative agriculture in all arenas and has a strong network of key stakeholders.

Website: https://sustainablefoodtrust.org/
Contact: Adele Jones, adele@sustainablefoodtrust.org

Vi-Agroforestry

Vi-Agroforestry is based in Sweden and supports a global network of projects advancing poverty alleviation and climate solutions through smallholder agroforestry projects.

Website: https://viagroforestry.org/
Contact: info@viagroforestry.org

World Agroforestry Centre

This organization support networks of stakeholders focused on advancing agroforestry practices. This is a large operation so funds would need to be earmarked for specific projects.

Website: http://www.worldagroforestry.org/
Contact: Cathy Watson, C.Watson@cgiar.org

Networking Globally

The International Soil Carbon Network, Regen Network, Foundation for Food and Agriculture Research, World Resources Institute, Colorado State, Global Soil Partnership ,Woods Hole, Nature Conservancy, Arizona State, ISRIC, 4 pour 1000, and a few others[2] are building multi-functional platforms for knowledge sharing on soil carbon across nations. We need a meeting to pull these groups together to avoid duplication and maximize collective impact. The hunger for an exceptional, open source hub and platform that aggregates soil carbon data over time was mentioned by dozens of respondents to our surveys and interviews.

Contact: Betsy Taylor, betsy@breakthroughstrategiesandsolutions.com

WASTE TO COMPOST

International

FUSIONS

This European Union effort to promote a circular economy for waste is dedicated to halving EU food waste. It works with governments, major food companies, and NGOs and has extensive networks of key stakeholders.

Website: https://www.eu-fusions.org/
Contact: Toine Timmermans, toine.timmermans@wur.nl

Zero Waste International Trust

This Australian NGO has championed policies and practices designed to capture food, animal, and human waste to build agricultural soils. Zero Waste work in this region has included a focus on regenerative agriculture and soil carbon sequestration.

Website: http://zwia.org/
Contact: Gerry Gillespie - gerry.b.gillespie@gmail.com

Saahas Zero Waste

This NGO works closely with major companies and communities in India and with households to promote reduction and capture of organic waste.

Website: http://saahaszerowaste.com/
Contact: Wilma Rodrigues, info@saahas.org

Zero Waste Wales

Wales is a model of circular economy work and the integration of waste into solutions for soils.

Website: https://gov.wales/topics/environmentcountryside/epq/waste_recycling/zerowaste/?lang=en
Contact: Mal Williams, mal.williams@zerowastewales.net

Songhai Centre

With offices in Benin, Liberia, Sierra Leone, and other parts of Sub-Saharan Africa, this group works to promote use of agricultural and food waste in farm systems and for bioenergy.

Website: http://www.songhai.org/index.php/en/home-en
Contact: songhai@songhai.org

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[2] https://mail.google.com/mail/u/1/?tab=cm#search/pete+smith/16683cb2f946219a?projector=1&messagePartId=0.1

Appendix II — More Information On Geographic Hot Spots

Foundations need to target regions where they can drive the greatest change. We have not undertaken the necessary mapping, but some locations do stand out for their early adoption of climate smart practices and for their importance for food security and the climate. We have included references to key groups in some but not all cases. These contacts can be consulted or approached to better understand work in each geography. This is not an exhaustive list of geographies or groups and nor is it prioritized, but all of these areas have strong momentum in support of healthy soils to cool the planet.

UNITED STATES

Maryland

Maryland has passed a Healthy Soils Policy and has all the ingredients for significant impact. Motivated largely by concerns over the Chesapeake Bay Watershed and with a strong climate commitment, Maryland's universities, NGOs, public officials, and farmers are excited about the potential of regenerative agriculture. Key groups: Future Harvest CASA, University of Maryland's Harry R. Hughes Center for Agro-Ecology, Maryland Dept. of Agriculture, Maryland Healthy Soils Consortium, U.S Fish & Wildlife Foundation.

Minnesota

Minnesota is the only midwestern state that has joined the US Climate Alliance. It has a strong network of groups with on-the-ground farmer networks. Minnesota's Land Stewardship Project, Main Street Project and the Institute for Agriculture and Trade Policy are playing important roles.

Illinois

Illinois has significant momentum in support of regenerative agriculture. IDEA Farm Network, Regenerate Illinois, Artisanal Grain Collaborative, and local foundations and state officials are engaged. Illinois Stewardship Alliance and Illinois Environmental Council are promoting health soils policy frameworks. Large agricultural interests are also engaged, in part through Farm Illinois. There is a strong farm to table network, farmer-to-farmer networks and training programs, established regional supply chain efforts, and partnerships and open communication with producers from commodity as well as more diverse farm producers.

INTERNATIONAL

Australia

Australia has a very active network of farmers, ranchers, researchers, policy leaders, investors, and NGOs working to promote climate smart and regenerative agriculture for water retention as well as climate

benefits. There is a market-based scheme as well as numerous voluntary efforts including work to capture waste for compost applications on land.

Democratic Republic of the Congo

This country has more than half of the remaining Congo Basin rainforest, the second largest rainforest on the planet. Smallholder farmers in search of fuel and land are one driving source of deforestation. Several NGOs and international agencies are working to address severe food insecurity, violence, and underlying causes of ecological degradation. Efforts to promote healthy soils and climate smart agriculture with a focus on agroforestry could help alleviate food security and emissions from deforestation.

Ethiopia

Agriculture is the backbone of Ethiopia's economy. The government has a strong commitment to climate mitigation and smallholder farmers produce 90% of agricultural output. There is a strong debate within the country over the future of agriculture. Give its leadership, size, and capacity for impact, this is a key target for further work. There are innovative NGOs working at the nexus of land rights, human rights, soil carbon sequestration and food security.

Finland

Finland is one of the most forward moving countries on carbon farming. It has strong engagement by companies, government, farmers and NGOS. The University of Helsinki, Finnish Meteorological institute, Center for Natural Resources, and 100 pilot farms in Finland are working with Carbon Action/ QVIDJA FARM. They have set up protocols on multiple farms to assess a range of practices and extensive measurement of co-benefits and impacts. This country is ahead of the curve and grants to Carbon Action could be focused on building knowledge sharing with networks in other countries and regions.

Brazil

Despite the challenges to democratic institutions and governance, Brazil is a critical nation for investment to advance healthy soils and agroforestry. There are several groups working to promote soil carbon sequestration through agriculture and forestry. Some of the larger groups include: Imaflora, ICV, Casa da Toca, Forest Agriculture and Climate Coalition, IPAM Amazonia, and Embrapa, an agricultural research company doing soil carbon mapping. There are also important local agroecological and indigneous groups. The AgroEcology Fund can help in providing key links to these farmer associations and land-based communities.

Indonesia

The tropical forests of Indonesia must be protected. Preventing further intrusion into forests by agriculture is critical. The David and Lucile Packard Foundation is playing a leading role here working with agricultural and forestry NGOs.

Mexico

Mexico is a diverse country with multiple agro-ecosystems and socio-economic conditions. Several NGOs and farmer groups are promoting agroforestry and silvopasture for small farms as a way to support rural livelihoods and soil carbon sequestration. Conservation agriculture, is increasingly being adopted for farms producing maize, wheat, sorghum, and vegetables. The World Bank has supported climate-smart agriculture projects here and there are many farmer associations and networks.

Uruguay

Uruguay has strong government interest in climate mitigation and adaptation through agriculture. The government unanimously passed legislation in 2018 to promote agroecological farming, in part in response

to consumer demand. Significant steps have been taken on reforestation and carbon sequestration. Agriculture (including land use change and forestry) is the largest contributor to GHG emissions in the country and it is also one of the most important sectors in the economy, representing 65% of the county's export sources.[3] The National Institute of Agricultural Research of Uruguay and a range of farmer groups and NGOs have conducted long term trials on soil organic carbon.

Andhra Pradesh, India

The Government of Andhra Pradesh has launched a scale-out plan to transition 6 million farms/farmers to 100% chemical-free agriculture by 2024. The project is focused on multiple sustainable development goals and is led by Rythu Sadhikara Samstha (RySS) — a not-for-profit established by the Government to implement the ZBNF program — and supported by the Sustainable India Finance Facility (SIFF) — an innovative partnership between UN Environment, BNP Paribas, and the World Agroforestry Centre. Five additional states in India are exploring Zero Budget Natural Farming and a shift to healthy soils.

Peru

Soil carbon sequestration in cropping systems, in spite of its importance, has only recently started to be quantified in Peruvian soils. The country has many soil types, altitudes, micro-climates, cropping systems and management regimes. Researchers with CATIE published research in 2018 showing strong potential for soil carbon sequestration particularly at deeper soil levels. They concluded that farm diversification strategies are needed to guarantee the conservation of ecosystems with high carbon soils and might be essential to help farmers adapt to the effects of climate change. Perennial cacao holds promise. There are many indigenous groups, farmer associations, and researchers focusing on soil carbon in Peru.

Colombia

This country has had interest in healthy soils and soil carbon sequestration for several years. A growing number of farmers have embraced holistic grazing, silvopasture, agroforestry, and conservation agriculture. There are several networks of academics, policy leaders, indigenous communities, and small and large farmers and ranchers. Deforestation and conversion of forests to agriculture remains a huge threat. Small holder adoption of diversified agroforestry systems integrating crops, trees, and some animals holds promise for forestry protection, food security, and climate mitigation and adaptation.

Honduras and Nicaragua

Catholic Relief Services/Water Smart Agriculture Team has a range of programs here working closing with farmer associations, progressive academics, and extension services. These nations, like a growing number, are facing a crisis of governance and stability. Stabilizing the food system and securing water and agricultural practices in the face of climate impacts are critical needs. In addition, soil carbon sequestration is possible in these hilly landscapes.[4]

Niger and Mali

These drylands and other parts of Sub-Saharan Africa are critical targets for land restoration. Groundswell International, World Vision, and World Agroforestry Centre have a several projects underway to strengthen soil health, accelerate farmer managed natural tree regeneration, and test soil fertility based on a range of field trials that have been going for nearly 30 years. Groundswell International is focused on advancing these regenerative projects while supporting movements for land rights, gender rights, and social justice.

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[3] http://siteresources.worldbank.org/INTLAC/Resources/257803-1235077152356/Country_Note_Uruguay.pdf

[4] http://www.fao.org/soils-2015/news/news-detail/en/c/318676/

Vietnam

CARE and World Agroforestry Centre are partnering with local farmer associations, extensions services, and academics to promote best practices for agroforestry for small landholders. There is an explicit inclusion of soil carbon sequestration in this effort in northwest Vietnam. Soil carbon baselines have been established. CCAFS IRRI Vietnam also points to coffee cultivation centers working on healthy soils and carbon sequestration.

Appendix III — More Information On Infrastructure Investments and Ecological Restoration

GREEN NEW DEAL AND INFRASTRUCTURE GROUPS

Alliances for Green Infrastructure
A program of Forest Trends
https://www.forest-trends.org/pressroom/alliances-green-infrastructure/

Data for Progress
This progressive group has played a central role in advancing the proposal for a Green New Deal in the United States. It is advocating for inclusion of land based solutions to the climate threat as part of the package.
https://www.dataforprogress.org/green-new-deal/

Green for All
Perhaps the leading group in the United States working for a rapid and just transition from fossil fuels that will generate jobs and economic security for all. Green for All is helping to advance the Green New Deal in the United States. It is beginning to explore job and wealth creation opportunities for disadvantaged communities interested in composting, urban agriculture, and land restoration for healthy soils.
http://www.greenforall.org

Green Infrastructure Foundation
Focused on green buildings and carbon removal through green roofs.
https://greeninfrastructurefoundation.org/

Green Forests Work
Focused on re-foresting in Appalachia
http://www.greenforestswork.org

Green Wave
Focused on a restorative coastal ocean farming industry
https://www.greenwave.org/greenwaveorg/

Nature Vest,
A program of the Nature Conservancy
http://www.naturevesttnc.org/investment-areas/green-infrastructure-for-cities/

ECOLOGICAL RESTORATION GROUPS

The Global Partnership for Forests and Landscape Restoration (GPFLR)
Is a global network that unites governments, organizations, academic/research institutes, communities and individuals under a common goal: to restore the world's lost and degraded forests and their surrounding landscapes
http://www.forestlandscaperestoration.org/

Appalachian Sustainable Development
This group promotes ecological restoration of former mining lands with a focus on sustainable agriculture. They have innovative leadership rooted in local communities and a track record of combining restoration with jobs and positive economic impacts.
https://asdevelop.org/sustainable-agriculture/

The Ecological Restoration Alliance of Botanic Gardens of the BGCI (Botanical Gardens Conservation International)
Over 100 Botanic gardens around the world have responded to the UN's challenge by joining together to form the Ecological Restoration Alliance of Botanic Gardens (ERA), with the objective of sharing their skills, resources and plant materials to scale up restoration activities around the world.
http://www.erabg.org/index/

Honor the Earth
Led by Native American activist Winona LaDuke, this group has made huge gains in restoring Native lands, creating new agricultural markets, and building healthy soils. Honor the Earth focuses on restoration of culture, lands, and people and is also part of efforts to secure a Green New Deal that provides job opportunities, incentives for land-based Native businesses, and land restoration.
http://www.honorearth.org/

The Great Green Wall Project
This African-led movement has an epic ambition to grow an 8,000km natural wonder of the world across the entire width of Africa. A decade in and roughly 15% underway, the initiative is already bringing life back to Africa's degraded landscapes providing food security, jobs and a reason to stay for the millions who live along its path.
http://www.greatgreenwall.org/about-great-green-wall/

Ecosystem Restoration Camps
This Dutch NGO is promoting ecological restoration through a program of long-term encampments involving global volunteers, local host families, and targeted restoration projects.
https://www.ecosystemrestorationcamps.org/

China's Green Foundation
CGF has convened and offered support to governments and NGOs engaged with ecological restoration as part of the Belt & Road Initiative.
http://www.cgf.org.cn/en/

Appendix IV — Additional Resources on Impact Investing

Investing in Food Systems: Gaps in Capital, Analysis and Leadership:
A 2018 guide to help foundations unleash their endowment capital for equitable and renewable food systems. Written by Jennifer Astone of Swift Foundation, this guide summarizes the needs, opportunities, obstacles and potential of impact investing in support of agroecological food systems. https://swiftfoundation.org/wp-content/uploads/2018/10/2018-Astone-Investing-in-Food-Systems.pdf

Let's Talk About Soil:
A Report for Impact Investors written by Impact Investors. An 8-page overview from 2016 of why soil matters, with several investment examples. http://www.triodosimpactreports.com/organicgrowthfund2016/Assets/Pdf/lets-talk-about-soil.pdf

Philanthropy and Impact Investment in Forestry
Nine foundations announced a commitment to land-based climate actions at the September Global Climate Action Summit where they made a $459 million philanthropic commitment to protecting forests and Indigenous Peoples' rights.
http://philanthropynewsdigest.org/news/nine-foundations-commit-459-million-to-global-climate-action

Regenerative Agriculture Investor Network:
A relatively new initiative providing consulting and programming for interested impact investors.
https://www.lifteconomy.com/rain/

TONIIC:
Koen van Siejen of TONIIC, a global impact investor network based in the UK, has created a podcast of interviews related to Investing in Regenerative Agriculture; as well as a summary article[5]. https://www.toniic.com/

Transform Finance:
Webinar highlighting loans to farms in the global south "Exploring Impact-Return Intersections in Underserved Communities in the Global South" April 26, 2018.
http://transformfinance.org/investor-resources/

The World Bank:
In December 2018, the Bank announced 200 billion dollars for climate action over the coming five years. A portion of this is earmarked for integrated landscape management including agriculture and forestry systems in up to 50 countries.
http://www.worldbank.org/en/news/press-release/2018/12/03/world-bank-group-announces-200-billion-over-five-years-for-climate-action

Council on Smallholder Agricultural Finance:
This group provides over $700 million in loans to small landholders and farmers. This annual report explores trends, opportunities, and challenges for unlocking agricultural financing at the scale required to

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meet global demand.
https://www.raflearning.org/topics/initiative-for-smallholder-finance

Fledge
Is a social enterprise accelerator that focuses on development of global for-profit businesses that align outcomes with the UN SDGs. Fledge contains a series of funds for investors, including Africa Eats, Food/Ag, and Aviary for growth stage businesses. Fledge also manages The Land Accelerator, a four day accelerate in Kenya on land restoration investing.
http://fledge.co/locations/land/

Global Impact Investor Network (GIIN):
This global network of large institutional impact investors provides resources and help to investors. It has *ImpactBase* — a searchable, online database of impact investment funds and products. Investors can carry out searches by asset class, impact themes, and geographic targets.
https://thegiin.org/impact-investing/

Appendix V: Additional Soil Health Investment Opportunities

Althelia Climate Fund II

The Althelia Climate Fund I was previously offered through Mirova, a private investment advisor that also manages the Land Degradation Neutrality Fund for the Global Mechanism, of the United Nations Convention to Combat Desertification. This second fund anticipates beginning to raise capital in Q4 2018, with a suggested minimum investment of $2 million. Not clear at press-time how directly soil-related its investments will be. Open to foundations and qualified private individuals.

Website: https://althelia.com/initiatives/climate-fund
Contact: James Rawles, james.rawles@mirova.com

Blackdirt Farms:

Blackdirt Farms is a regenerative grass-fed beef producer that operates farmland directly on behalf of investors. Blackdirt's strategy aims to achieve high animal welfare standards, strong ecological benefits, and more healthful food. Targeted ecological impacts primarily include the elimination of nitrogen fertilizer, growth of soil, and storage of carbon. Blackdirt is currently raising secured cattle notes (1- and 3-year tenure) to scale its business. For farmland investors, Blackdirt locates, purchases and operates farmland in the Southeast U.S. via long-term lease and management contracts.

Website: https://blackdirtcapital.com/
Contact: info@blackdirtcapital.com

Dirt Capital Partners

Dirt Capital Partners invests in farmland in partnership with Northeast farmers with high standards for ecological land management, in order to facilitate sustainable farmers' land access, security, and farm profitability. Creates farmland transitions with long-term leases that provide defined pathways to ownership, while providing farmer-partners with technical assistance for land acquisition and business planning. Are seeking new investor members over the next year.

Website: https://www.dirtpartners.com/
Contact: Jacob Israelow, jacob@dirtpartners.com

EcoEnterprises Partners III,LP (EE3)

A venture fund, launched in 2018, that will invest in a diversified portfolio of 15–18 companies working through sourcing practices to preserve precious ecosystems and biodiversity in Latin America. Offers tailored growth capital to companies that build inclusive business models and fair value chains around nature-based product portfolios in sectors like sustainable agriculture, agroforestry and wild-harvested forest products, sustainable aquaculture, ecotourism, and certified forestry. Women-owned and managed investment firm has worked in Latin America for 20 years and offered two previous funds. Expect to raise capital until Dec. 2019; suggested minimum $250,000; accredited investors only. Also available at lower amounts through Impact Assets Donor Advised Funds.

Website: https://ecoenterprisesfund.com/index.php/investments/fund-iii-the-opportunity
Contact: Tammy Newmark; tnewmark@ecoenterprisesfund.com

Land Degradation Neutrality Fund

The LDN fund aims to support sustainable land management and land restoration projects undertaken by the private sector worldwide. Launched at COP 13, and initially designed by Global Mechanism of the UN with support from the governments of France, Luxembourg, and Norway, the Rockefeller Foundation, and more, the LDN is managed by Mirova, a private investment advisor. It will invest in financially viable private projects on land rehabilitation and sustainable land management worldwide, including sustainable agriculture, sustainable livestock management, agro-forestry, and sustainable forestry. The LDN Fund will report on soil carbon, as one of the official indicators for SDG 15.3, using on-site measurements. It is open to foundations and qualified private individuals; minimum investment size generally $2 million.

Website: https://www.unccd.int/actions/impact-investment-fund-land-degradation-neutrality
Contact: James Rawles: james.rawles@mirova.com

Meyer Family Enterprises

Meyer Family Enterprises is exploring assembling a group of family offices to bring together collaborative capital to invest in sustainable agriculture, with a particular interest in companies with high quality supply chains. Those interested in exploring this potential vehicle or hearing more about nearer-term opportunities they are familiar with in regenerative agriculture space.

Website: http://www.mfenterprises.com/
Contact: Stephen Hohenreider, stephen@mfenterprises.com

Native Energy

This group works with major corporations to provide regenerative agriculture and other carbon offsets.

Website: https://nativeenergy.com/
Contact: support@nativeenergy.com or call 800-924-6826

No Regrets Initiative

This holistic and relationship-based approach to asset management and regenerative agriculture provides investment, educational and conversational opportunities.

Website: http://www.noregretsinitiative.com/
Contact: Avery Anderson Sponholtz, avery@globetrotterfoundation.org

Organic Agriculture Revitalization Strategy (OARS)

This initiative helps investors by using value chain analysis to identify investable opportunities across asset classes not just in farmland, but in enterprises supporting those farms and processing, distributing, marketing, and adding value to their products. Some projects may provide market-rate returns; others require concessions. Developed by Croatan Institute and Earthwise Organics with initial support from Organic Valley's Farmers Advocating for Organics program, OARS aims to identify business and economic development opportunities initially in North Carolina.

Website: http://www.croataninstitute.org/sustainable-rural-development-projects/project/organic-agriculture-revitalization-strategy
Contact: Josh Humphreys, josh@croataninstitute.org

Shared Capital Cooperative

Shared Capital Cooperative is a national CDFI loan fund committed to building a just, inclusive and democratic economy. They are partnering with Main Street Project to provide loans to small-scale, poultry-centered regenerative farms as a pathway out of poverty for typically exploited Latino farmers and families while simultaneously reducing water pollution, greenhouse gas emissions, soil loss and increasing biodiversity, soil health and food security. Shared Capital provides financing for the expansion and startup of cooperatively-owned businesses throughout the US. Shared Capital is itself a cooperative, owned by 250 cooperatives nation-wide.

Website: https://sharedcapital.coop/
Contact: Christina Jennings, christina@sharedcapital.coop

SLM Partners

SLM Partners is an asset manager that acquires and manages rural land on behalf of institutional investors. It works to scale up regenerative, ecological farming and forestry systems that deliver financial returns and environmental benefits.

Website: http://slmpartners.com/
Contact: Paul McMahon, paul.mcmahon@slmpartners.co.uk

Soil Capital

Farm managers who partner with farmers, organizations, and investors to scale and sustain regenerative agriculture. While not currently raising capital; investors who wish to be notified of future opportunities should contact Alex Trenor.

Website: https://www.soilcapital.com/
Contact: Alex Trenor; a.trenor@soilcapital.com

WineBaa

This is a start-up company based in Sydney, Australia that has developed a physical device allowing sheep to graze in vineyards and orchards while preventing them from eating foliage and fruit. Device is weighted such that it moves into the way when sheep try to eat foliage or fruit, and out of the way when sheep graze from the ground. Helps minimize use of herbicides and allows sheep manure to fertilize vineyard soil and build carbon. Self-funded thus far, but open to exploring ways investor debt or equity might help scale the business.

Website: https://winebaa.com/
Contact: David Robertshaw; admin@winebaa.com

Food System 6

Food System 6 is an innovative non-profit based in the San Francisco Bay Area whose mission is to support entrepreneurs who are transforming how we grow, produce and distribute food. FS6 runs a comprehensive accelerator program that includes a wide range of business and organizational support designed to help entrepreneurs accelerate their growth and their impact. They can help connect you to innovative startup companies working on regenerative agriculture.

Website: https://www.foodsystem6.org
Contact: Renske Lynde; Managing Partner; renske@1cc.vc

Appendix VI — Additional Soil Resources

FAO Soils Portal

Global Soil Partnership

Soil Health Institute

Rodale Institute

KnowSoil

Save Our Soils

The Carbon Farming Solution

WOCAT SLM Database

Global Alliance for Climate Smart Agriculture

International Panel of Experts on Sustainable Food Systems

Best Bets Compendium;

Climate Smart Agriculture Country Profiles

SARE

German Ministry for Economic Cooperation and Development

Norwegian Agriculture Authority

UNCCD Knowledge Hub

Pastoralist Knowledge Hub

Appendix VII — Experts and Farmers Interviewed and Surveyed

Viridiana Alcantara, Federal Office for Agriculture and Food (Germany)

Avery C Anderson Sponholtz, Globetrotter Foundation

Tioro Andre, ROPPA, West Africa (ECOWAS/UEMOA)

Lori Arguelles, Alice Ferguson Foundation

Margarita Astralaga, International Fund for Agricultural Development (IFAD)

Matt Baker, William and Flora Hewlett Foundation,

David Bakke, Audubon New Mexico

Million Belay, Alliance for Food Sovereignty in Africa

Kofi Boa, Center for No-Till Agriculture

George Boody, Land Stewardship Project

Deborah Bossio, The Nature Conservancy

Kevin Boyer, Regenerative Agriculture Foundation

Steve Brescia, Groundswell International

Renata Brillinger, CalCAN

Elly Brown, San Diego Food System Alliance

Gabe Brown, Soil Health Institute

Roland Bunch, Agronomist

Sallie Calhoun, Quivira Coalition

Zoraida Calle, CIPAV (Center for Research on Sustainable Agriculture)

Claire Chenu, AgroParisTech

Jon Connors, Blockchain For Ecology

Doug Crabtree, Vilicus Farms

Jeff Creque, Carbon Cycle Institute

Cynthia Daley, California State University, Chico

Noah Deich, Carbon 180

Marcia DeLonge, Union of Concerned Scientists

Sally Dodge, Iroquois Valley Farmland REIT

Diana Donlon, Soil Centric

Rick Duke, Gigaton Strategies, LLC

Torri Estrada, Carbon Cycle Institute

Travis Franck, Climate Interactive

Chad Frischmann, Project Drawdown

Jason Funk, Carbon 180

Dennis Garrity, World Agroforestry Centre (ICRAF), Nairobi.

Aster Gebrekirstos, World Agroforestry Centre (ICRAF),

Gerry Gillespie, Returning Organics to Soil

Meredith Girard, Town Creek Foundation

Catha Groot, Radicle Capital

Mike Grundy, The Commonwealth Scientific and Industrial Research Organization (CSIRO)

Serena Guarnaschelli, KOIS Invest

Reginaldo Haslett-Marroquin, Main Street Project

Steve Hohenrieder, Meyer Family Enterprises

Jacob Israelow, Dirt Capital Partners

Christophe Jospe, Nori

Saara Kankaanrinta, Carbon Action

Jack Kittredge, Northeast Organic Farmers Association

Dan Kittredge, Bionutrient Food Association

Dominik Klauser, Syngenta Foundation

Gregory Landua, Regen Network

Timothy LaSalle, California State University Chico

Bernice Lee, Hoffman Centre for Sustainable Resource Economy

Johannes Lehmann, Cornell University

Peter Lehner, Earthjustice

Andre Leu, IFOAM – Organics International.

Josette Lewis, Environmental Defense Fund

David LeZaks, Delta Institute

Paul Luu, "4 per 1000" Initiative

Renske Lynde, Food System 6

Shoba M. Liban, Pastoralist Women for Health and Education

Jane Maland Cady, McKnight Foundation

Chris Meyer, Environmental Defense Fund

Luca Montanarella, European Commission

David Montgomery, Universtiy of Washington

Daniel Moss, AgroEcology Fund

James Mulligan, World Resources Institute

Tom Newmark, The Carbon Underground

Gerald Nkusi, Adventure Learning and Community Development Initiative Uganda

Calla Rose Ostrander, Phoenix Rising Resources

Alyssa Pace, LoaCom

Esther Park, Cienega Capital

Keith Paustian, Colorado State University

Max Purnell, Farmer, New Zealand

Shyla Raghav, Conservation International

Tonya Rawe, CARE

Julie Rawson, Northeast Organic Farmers Association

Tantely Razafimbelo, University of Antananarivo, Laboratoire des Radioisotopes

Ruth Richardson, Global Alliance for the Future of Food

Kristoffer Rønn-Andersen-Regen, Farmer, Denmark

Rebecca Ryals, University of Hawai'i at Mānoa, Hawaii (UH Manoa)

Elsa Sanchez, Catholic Relief Services

Ernie Shea, CSA Alliance

Christian Shearer, Regen Network

Whendee Silver, University of California Berkeley

Pete Smith, The University of Aberdeen.

Ethan Soloviev, HowGood, Inc.

Connor Stedman, AppleSeed Permaculture

Christine Su, PastureMap

Daniel Swid, Regen Network

Will Szal, Regen Network

Kevin Tidwell, Grantham Foundation

Lauren Tucker, Kiss the Ground

Rik van den Bosch, Word Soil Information or International Soil Reference and Information Centre (ISRIC)

Sonja Vermeulen, Hoffmann Centre, Chatham House

Andrew Voysey, University of Cambridge Institute for Sustainability Leadership

Matthew Warnken, Corporate Carbon

Seth Watkins, Pinhook Farm

Sarah Wentzel-Fisher, Quivira Coalition

John Wick, Marin Carbon Project

Simon Winter, Syngenta Foundation for Sustainable Agriculture

Lini Wollenberg, University of Vermont

Ana Yang, Hoffman Centre for Integrative & Functional Medicine

For more information about Breakthrough Strategies and Solutions and our work on soil carbon sequestration, go to https://breakthroughstrategiesandsolutions.com. To send feedback on this guide, send a message to info@breakthroughstrategiesandsolutions.com