



UN Secretary General Climate Action Summit
23 September 2019

Nature-Based Solutions Workstream

Contribution on Soil Carbon

Revised 6 May 2019

I. Title/Heading: Building a global soil movement through philanthropic investment

II. Context and rationale

The 2015 Paris Agreement requires dramatic reductions in greenhouse gas (GHG) emissions and large-scale capture and sequestration of CO₂ from the atmosphere. Afforestation, reforestation, bioenergy with carbon capture and storage, direct air capture, and biochar have received significant attention through the UNFCCC and IPCC processes, but the broader role of agriculture and grazing lands as potential sinks has only recently gained widespread consideration. Changes in agricultural land management, combined with conservation and restoration of forests, wetlands and grasslands, can provide over one-third of the cost-effective nature-based climate mitigation needed to stabilize global warming below 2°C.¹

Building healthy soil, or more specifically, building soil carbon via farming practices, represents a natural form of carbon sequestration that protects the landscape's surface above and generates biological activity below, while at the same time, it reduces water use, as well as water pollution by reducing soil erosion and non-point source pollution from fertilizer run-off. Increasing the amount of organic matter in the soil will allow it to store more carbon, and research has found that it can be done within three to 10 years.²

Over the last 150 years, the global trend towards industrialized farming—including use of fertilizers and practices that release soil carbon into the atmosphere via frequent tilling and exposing soil without cover crops—has led to high rates of soil organic carbon loss. The top 10 countries ranked by soil organic carbon loss are (1) China, (2) United States, (3) Australia, (4) Brazil, (5) Kazakhstan, (6) Argentina, (7) India, (8) Mexico, (9) South Africa, and (10) Germany.³

¹ Griscom et al (2017). Natural Climate Solutions. PNAS. <https://www.pnas.org/content/114/44/11645>

² USDA Natural Resources Conservation Service, "Soil Health Key Points," February 2013. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1082147.pdf

³ Jonathan Sanderman et al, Woodshole. (2017) <https://www.pnas.org/content/pnas/suppl/2017/08/15/1706103114.DCSupplemental/pnas.1706103114.sapp.pdf>

III. Overview of the contribution

The Global Alliance for the Future of Food is an alliance of 25 philanthropic foundations, which invests in projects on all five continents. The Global Alliance works with its members and with others to transform global food systems. Our program area on climate aims to reduce GHG concentrations by transforming food systems globally and improving the climate resiliency of food systems. One of our focus areas is fostering a global movement on healthy soils in order to unlock the multiple co-benefits, including soil carbon sequestration. We do this by (1) convening key system actors representing a diversity of local, regional, international, sectoral and socio-economic perspectives and facilitating dialogue around a shared vision and action plan; (2) forging new insights based on diverse and emerging evidence; (3) facilitating a global movement amongst our foundation members and their vast international network of grantees and partners; and (4) supporting the alignment and utilization of all forms of capital via impact investing.

Our philanthropic members and partners represent over USD\$60 billion in assets and support more than 40 soil-related projects in over 20 countries, such as Madagascar, Malawi and Senegal in Africa; Kyrgyzstan in Central Asia; Peru and Bolivia in Latin America; California, Chesapeake Bay Region and the Mississippi River Basin in the United States (see annex for a sample list and description of projects).

IV. How does the contribution leverage living natural systems as a solution to avert climate change?

Over the past years, scores of new scientific studies have confirmed that we can cool the planet with land-based solutions. Evidence is showing that compost, silvopasture, cover crops, storing soil carbon at depth, and perennial crops can contribute significant mitigation potential towards the objective to keep global warming below 1.5C. Published estimates of mitigation potential of soil carbon sequestration (SCS) range from 1.5 to 15.6 Gt CO₂ in 2030, representing a significant contribution to UNEP's emissions gap estimate.⁴

V. How might the contribution support both climate, mitigation and adaptation as well as other important co-benefits and social, economic and environmental outcomes?

Research has demonstrated that a targeted sustained effort to improve healthy soils will help boost food production addressing food security concerns, and improve rural livelihoods through new job creation and better income, particularly if done with an eye to ensure equity, land rights, and social justice.

Healthier soils also contribute to climate adaptation because they are more resilient to extreme weather events, enhancing food security. Soils with higher levels of organic content are able to absorb much greater amounts of water from extreme downpours, resulting in less run-off and flooding. Plants grown in healthier soils are shown to increase plant growth and strengthen root systems. On these benefits alone, we have no time to waste. Countries are already suffering from the effects of climate change: Cyclone Idai in March 2019 damaged nearly one million acres of crops just before

⁴ Healthy Soils to Cool the Planet. Breakthrough Strategies and Solutions (2019).

harvest, as well as seed stock for the next agricultural season. Also in March 2019, the U.S. upper Midwest experienced deadly floods from a ‘bomb cyclone’ that damaged crops and drowned livestock.

VI. Which countries and organizations are involved in the contributions?

See annex for a sample list of projects in more than 20 countries on five continents that the Global Alliance represents.

VII. How have stakeholders been consulted in developing the contribution?

The Global Alliance seeks to foster deep collaboration amongst philanthropy, researchers, grassroots movements, businesses, financial institutions, farmers and food systems workers, Indigenous Peoples, government, and policymakers. It consults stakeholders directly through (1) strategic convenings (e.g., International Dialogues), (2) member foundations (i.e., as consultation conduits), (3) collaborations with global institutions and other stakeholder networks (e.g., IFAD, FAO, World Business Council for Sustainable Development, African Food Sovereignty Alliance, C40, Under2 Coalition), and (4) the establishment of advisory committees for each major piece of research commissioned. Via all channels of consultation, diverse institutional and individual perspectives, opinions, outlooks, and lived experience are respected and valued.

VIII. Where can the contribution be put into action?

Just like with other major issues, such as around civil rights, slavery or HIV, food systems transformation cannot be driven by one major intervention or one major project alone. A commitment to a common aim and a platform for aligning the multitude of interventions and activities at global, national and local levels are needed. As a network of networks, the Global Alliance identifies priority actions at local, regional, national, global scales and work to connect a multifaceted movement of soil champions around the world. Through this process, our ultimate aim is to build awareness and support by a majority of countries on the significant contribution of healthy soils in the next round of Nationally Determined Contributions (NDCs).

IX. How will the contribution be delivered? How will different stakeholders be engaged in its implementation? What are the potential transformational impacts?

We are planning to follow up with further international dialogues over the next 12 months, which will (1) expand and strengthen an emerging, informal global network on climate change and food systems, including a specific focus on nature-based solutions, such as soil carbon sequestration and agroecological practices; (2) explore tangible action plans and initiatives in line with the Paris Agreement and the Sustainable Development Goals with an emphasis on systems thinking and multiple benefits; (3) identify the next steps necessary for addressing knowledge gaps, follow-up research, effective action, and policy; (4) showcase research, pilot projects, model policies, and incentives for hastening adoption of best and emerging practices in GHG reductions and carbon sequestration; and (5) motivate all participants to think and act boldly to expedite progress.

X. Is this initiative contributing to other Climate Action Summit workstreams (industry transition; energy transition; climate finance and carbon pricing; infrastructure, cities and local action; resilience and adaptation; youth and citizen mobilization; social and political drivers; mitigation strategy)?

A global soil carbon initiative contributes to all other workstreams in important and systematic ways:

- Industry transition: Healthy soil strategy supports a growing industry commitment to climate action by reducing the need for GHG-causing land-use practices, including chemical use, deforestation and tilling.
- Energy transition: Reducing chemical fertilizer production, which is energy intensive, will result in less CO2 emissions from the agricultural sector. Reducing the need for external inputs also lowers emissions associated with transport and logistics.
- Cities and local action: Healthy soils contribute to a more self-sufficient city-region food system and empowers them to take a greater leadership role in GHG emissions reduction.
- Resilience and adaptation: Soils with higher organic content are more resilient to extreme weather events and leads to reduced water use.
- Youth and citizen mobilization: A movement around healthy soils is inherently locally based and applicable to all socio-economic contexts, empowering women, Indigenous Peoples, low-income households and youth in particular.
- Social and political drivers: Healthier soils contribute to food security, more sustainable and economically productive farmland and therefore less urban-rural and gender inequality.
- Mitigation strategy: Soil health is a mitigation strategy, by enabling soils to have the ability to draw carbon out of the atmosphere.

XI. Examples of experiences to date: how does this contribution build upon this experience? How does the contribution link with different ongoing initiatives?

We will work in partnership with the “[4 pour 1000](#)” initiative launched at COP 21, which sets the goal of a 0.4% annual increase in soil carbon sequestration in cultivated landscapes, and proposes a global research program for advancing understanding of how to better sequester carbon in the soil. We will also partner with Global Soil Week, which engages high-level political leaders around creating enabling environments for sustainable and climate resilient agriculture in Africa. We also seek to leverage the momentum created by the Global Healthy Soil Challenge, launched at the Global Climate Action Summit in 2018, led by California and supported by France and the Netherlands. We will follow-up on and expand upon an International Dialogue on climate and food systems held in 2017 by the Global Alliance, which brought together over 250 experts and actors from 40 countries. We expect that the evidence and knowledge generated by the projects in our network will support the political discussions in the Koronivia dialogue.

XII. Mechanisms for funding (with specific emphasis on potential for partnerships)

The Global Alliance for the Future of Food represents a network of philanthropic foundations which fund initiatives to enhance soil carbon. Philanthropic investments take the form of grants for research, pilots, advocacy, coalition building, as well as direct investments in the form of impact investing, strategic convenings and dialogues, and strategically communicating the knowledge and evidence base.

XIII. Means of stewardship, metrics for monitoring

Our success will be measurable by the extent of the focus on soil carbon by policymakers, the enactment and inclusion of policies and solutions in NDCs, and the resulting impact on future resources committed to researching, developing, and deploying appropriate initiatives on enhancing soil carbon.

XIV. Communications strategy

As a network representing a diversity of philanthropic interests and perspectives, the Global Alliance is seen as a trusted, credible messenger. A strategic communications and media strategy to create a global spotlight and build political awareness on the GHG emissions reduction potential and other socio-economic and environmental benefits is under development with members and partners specializing in global and regional political communications.

XV. Contact details of proponents

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The Global Alliance for the Future of Food

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A list of the member foundations, as well as a description of how we work, can be found on our website. A sample list of projects focused on healthy soils and soil organic carbon supported by our network can be found in the annex.

Annex: List of selected philanthropic projects supporting soil health and soil carbon sequestration

AgroEcology Fund

Central Asia (Mongolia, Kyrgyzstan and Russia)

The Central Asian Collaboration restores ancestral practices of sustainable pastoralism, recovery of pastoral ecosystems (healthy soils for robust perennial pasture), revival of aboriginal livestock breeds which feed on and fertilize pasture, and traditional food production for upholding self-determined development of local communities.

Africa (continental)

The Alliance for Food Sovereignty (AFSA) organizes training courses on revitalizing soil health and fertility through biofertilizers. Participants multiply trainings: in Burkina Faso, the Ministry of Agriculture trained 180 technical agents. In Senegal, We Are the Solution - a women-led agroecology campaign - trained 30 women leaders. In East and Southern Africa, participants share post-training learnings through a Whatsapp group.

West Africa

With the Sahel desert encroaching, Groundswell International's West Africa affiliates pursue farmer-managed natural regeneration so that native trees grow on land often razed bare. Leaves decompose and become fertilizer; roots fix nitrogen and build up soil structure and microbiology. Carbon is sequestered and soil retains moisture, and firewood - often scarce - is available through repeated pruning.

Americas and Asia Pacific

The International Indian Treaty Council (IITC) represents 93 Indigenous affiliates from five regions to restore, revitalize, protect and strengthen soil and food systems through sharing seeds, knowledge, and practices among Indigenous food producers.

Agropolis Fondation

Africa (Madagascar)

Project title: Soil ECological function REstoration to enhance agrosystem services in rainfed rice cropping systems (SECuRE)

Project description: The importance of soil ecological processes and functions for plant growth and other ecosystem services makes soil an essential component of sustainable agroecological systems. Soil (ecological) Function Restoration, i.e. the intensification of these ecological processes, during agroecological transitions, is the core of our project. The overall objective of the SECuRE project is to provide Soil Function Restoration (SFR) practices based on local and scientific knowledge, in order to increase agronomic, socio-economic and ecological performances of agroecological agrosystems in a tropical context.

SFR aims to optimize current farmers' practices and propose innovative practices that will promote soil habitat in order to intensify associated soil and plant functions. The project will (i) assess local knowledge and farmers' interventions on SFR, (ii) contribute to improve scientific knowledge of SFR on diverse plant functions, (iii) test at field level various SFR practices, (iv) evaluate the impact of SFR practices in terms of agronomic, socio-economic and ecological performances, and (v) disseminate results.

Expected results

- Update information on farmers' practices and knowledge on soil function restoration
- Update knowledge on the soil-plant interactions following different restoration practices
- Characterize the joint agronomic and ecological performances of agrosystems and more specifically on SFR practices
- Disseminate the 'best' restoration practices, 'best' meaning the ones improving both agronomic and ecological performances
- Organize annual farmer visits of field trials
- Publish in peer-reviewed journals
- E-learning and training of Masters and PhD students

Agropolis Fondation and Total Foundation

Africa (Senegal, Kenya, Zimbabwe) and France

Project title: Dynamics of Soil Carbon Sequestration in Tropical and Temperate Agricultural systems (DSCATT)

Project description: Through a multi-scale, systemic and multi-actor approach, the DSCATT project explores the potential for sequestering carbon in cultivated soils, considering the sustainability of agricultural practices in the context of global changes. It aims to identify and examine interactions between biophysical and socio-economic drivers and processes across temporal and spatial scales to better understand the determinants and social and institutional conditions of adoption of soil carbon-enhancing farming and institutional strategies. Such process and interactions imply transdisciplinary work using a conceptual social-ecological systems framework. It is contributing to meet the objectives of the "4 per 1000" Initiative, launched by France on 1 December 2015 at the COP 21. DSCATT's main research question is, *"What are the long-term efficient strategies to foster soil carbon sequestration in agricultural systems?"* It involves:

- Quantifying and analyzing the soil carbon sequestration dynamic in different agricultural systems;
- Modelling long-term soil carbon sequestration at crop-soil, farm and landscape scales;
- Co-designing future sustainable agricultural systems that optimize the trade-off between soil carbon sequestration and productivity;
- Sharing knowledge, tools and experiences on soil management options.

Project sites:

- Senegal: Agro-sylvo pastoral system in the GroundNut Basin;
- Kenya: Integrated soil fertility management agriculture;
- Zimbabwe: Conservation agriculture and crop livestock integration;
- France: Crops and agroforestry in Mediterranean region.

India Climate Collaborative

India

Agricultural and forest lands represent 70% of India's total area, contain 95% of its biodiversity and provide livelihoods to 700 million people. These lands carry immense potential for carbon removal via improved agriculture and reforestation. India faces extreme pressure on its land, due to high population density and growth, and low agricultural productivity. Unsustainable agricultural practices and degrading forest quality has slowed India's progress on mitigation and sequestration goals. The India Climate Collaborative consists of over 20 philanthropies and includes a dedicated focus on land use. Examples of initiatives funded by its members:

Zero Budget Natural Farming

Funded by Azim Premji Philanthropic Initiatives and in partnership with the Andhra Pradesh Department of Agriculture, Rythu Sadhikara Samstha and civil society partners, this initiative aims to address risk and vulnerability of small and marginal farmers due to climate shocks and distress due to indebtedness. It provides farmer-to-farmer extension, demonstration and scaling of natural farming models and access to credit and markets through farmers' institutions. The initiative currently supports 500,000 farmers with a target of reaching 6,000,000 farm families by 2024 in Andhra Pradesh. Through natural farming practices, this initiative supports the increase of soil organic carbon stocks and improved soil and land health of the ecosystem.

Promise of the Commons

Village Commons (forests, pasture, and water bodies), constituting of a quarter of India's landmass, are poorly governed leading to degradation of natural resources and loss of local livelihoods. The Foundation for Ecological Security, in partnership with 5 state governments and more than 50 NGOs, enables rural communities to organize themselves, access secure legal rights to their Commons, prepare resource management plans and unlock public investments to improve ecological health and local livelihoods, as well as contribute to broader goals of biodiversity conservation and climate action. They have reached 9.2 million people, forming 16,650 community institutions across 10 states of India (5.9 million acres of common land brought under community governance). They seek to reach 38 million people, covering 30 million acres through the establishment of 90,000 community institutions by 2023. Through this work, they expect to increase carbon stock by 2.6 times and soil organic carbon by 30-40% while improving the resilience and adaptation to climate change of rural households.

California Foodshed Funders

California

California Foodshed Funders is a fellowship of funders which brings members together for shared learning in four focus areas of regenerative and organic agriculture, rural economies and livelihoods, soil and carbon drawdown, and equity and justice. Members include: 11th Hour Project, #NoRegret

Initiative/Globetrotter Foundation/Cienega Capital, Campbell Foundation, Ceres Trust, Clarence E. Heller Charitable Foundation, First Nations Development Institute, Gaia Fund, Regenerative Agriculture Foundation, TomKat Ranch Educational Foundation. Members fund the following initiatives related to soil carbon:

California Association of Resource Conservation Districts (RCDs)

RCDs are one of California's most proactive agencies that are working with landowners to increase their climate beneficial practices. The regional RCDs work on the ground on climate beneficial plans for landowners.

California Indian Basket Weavers Association

CIBA's vision is to preserve, promote and perpetuate California Indian basketweaving traditions while providing a healthy physical, social, spiritual and economic environment for basketweavers. This group is significant in ecological practices and nature-based solutions to climate as basketweavers have managed our wild lands for plants via regenerative forestry practices over a millennia.

CalCAN

CalCAN is a statewide coalition that advances policy to realize the powerful climate solutions offered by sustainable and organic agriculture. We represent a statewide network of sustainable farmers and ranchers and allied organizations, agricultural professionals, scientists, and advocates.

Carbon Cycle Institute

The Carbon Cycle Institute's mission is to stop and reverse climate global change by advancing science-based solutions that reduce atmospheric carbon while promoting environmental stewardship, social equity and economic sustainability. The Carbon Cycle Institute (CCI) is advancing this mission through our Ag Carbon Program, which is advancing carbon farming and regenerative rangeland management that builds soil carbon and critical ecosystem services on ranches, farms and working landscapes.

Chico State Regenerative Agriculture Initiative

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.

Savory Institute

Our mission is the large-scale regeneration of the world's grasslands through Holistic Management to address the global issues of desertification, climate change, and food and water insecurity.

Holistic Management International

Since 1984, HMI has helped communities grow and thrive by educating family farmers and ranchers and pastoralists in regenerative agricultural practices that empower them to strengthen their businesses, produce healthier food, improve local wildlife habitats and protect the environment.

Jefferson Center for Holistic Management

The Jefferson Center for Holistic Management is an accredited hub with the [Savory Global Network](#). The hubs serves Northern California (south to San Luis Obispo County and north to the Oregon border) and Nevada. Each Savory Hub must have a demonstration site managed by the hub leaders that is continually under Holistic Management. We like to call the “demonstration site” our “learning site” because we are learning everyday how to better behave toward the complex ecosystem we are all part of. Our learning site is the Smith Family’s certified organic ranch, [Springs Ranch](#), owned and operated by Steve and Pati Smith, near Fort Bidwell, California.

Chesapeake Bay Funders Network

United States (Chesapeake Bay)

A number of grant-makers engaged with the [Chesapeake Bay Funders Network](#) are supporting or will be supporting a variety of projects and initiatives intended to scale up implementation of practices that improve soil health. They have also been working collaboratively to identify opportunities and effective approaches to convene practitioners and engage federal and state agencies to identify opportunities and help coordinate and align programs and funding around developing state and regional soil health strategies.

On January 17, 2019, grant-makers engaged with the Chesapeake Bay Funders network hosted a Chesapeake Soil Health Forum engaging farmers, researchers, technical assistance providers and policy leaders in a discussion focused on how the philanthropic community could best support scaling up practices that increase soil health in the region and within each state. Over 50 people attended from PA, DE, MD, VA as well as the Soil Health Institute, NRCS headquarters, and state and regional funders. On February 26, 2019, Sustainable Agriculture and Food System Funders (SAFSF) set up a meeting between Chesapeake regional grant-makers and the Secretaries of Agriculture from the region to discuss how philanthropy can best support their efforts to improve soil health. They indicated a strong interest in partnering with philanthropy and are working with the Chesapeake Bay Funders Network on follow-up actions.

United States (Pennsylvania, Maryland, Delaware, West Virginia, Virginia)

[The National Fish and Wildlife Foundation](#), in coordination with several other U.S. federal agencies and corporate funding partners, is currently implementing a special funding initiative to advance healthy soils projects as part of efforts to restore the Chesapeake Bay estuary. The roughly \$3 million initiative will provide competitive grants to state agencies, academic institutions, nonprofit organizations, and robust collaborative partnerships for projects that advance implementation of core soil health practices that help achieve Bay clean up, state and regional climate mitigation goals and adaptation commitments, and regional agricultural sustainability initiatives. Priority interventions are likely to include improved planning tools and measurement approaches, farmer education and outreach efforts, technical assistance, and novel implementation approaches and incentives to drive increased adoption of core soil health practices. NFWF is currently soliciting project proposals through early summer 2019 and anticipates additional funding and programming through at least 2022.

United States (Maryland)

As part of its final sunset grant-making, [Town Creek Foundation](#) has invited a proposal from the *Million Acre Collaborative*, a cooperative effort led by Future Harvest-Chesapeake Alliance for

Sustainable Agriculture and six other partners aimed at getting one million acres of cultivated farmland into verifiable healthy soils and regenerative practices by 2030. The effort will address economic, educational, and institutional barriers, thereby significantly accelerating adoption of multiple practices that enhance soil health and produce associated economic, water quality, and carbon sequestration benefits. Town Creek Foundation expects to make a small number of multi-year grants in the \$3-5 million funding range in 2019 intended to shift trajectories and catalyze progress towards sustainable natural, economic, and social systems.

United States (Virginia)

Working within the Chesapeake Bay Funders Network, the [Agua Fund](#) is supporting development of the *Virginia Soil Health Coalition Strategy* to significantly scale soil health practices, sequester carbon, improve water quality and increase agricultural resilience by pursuing focused policy, outreach, market development and applied science objectives. The initiative draws on models in other states and builds on existing partnerships within Virginia's agricultural, conservation, academic and state policymaking communities. It intentionally leverages other foundation and government funding work to increase agricultural sector resilience to climate change, increase market share for sustainably produced crops, and achieve state and federal water quality goals.

United States (Virginia)

[The Prince Charitable Trusts](#) are supporting three projects to expand the use of sustainable, intensive rotational grazing practices in the production of grass-fed beef in the Piedmont region of VA. This includes an assessment of the potential for an institutional market for locally and sustainably raised beef and the ability of the region's farms, ranches and supply chain infrastructure to satisfy the market potential. They are also supporting an effort to better coordinate and deliver technical assistance to farmers to adopt intensive grazing practices through the establishment of a farmer-to-farmer assistance network. If successful, these efforts would lead to a significant increase in the number of acres managed intentionally to increase soil carbon.

The Christensen Fund

Global and Local (with a focus on Indigenous Peoples)

Stewardship of biocultural diversity quite literally begins with soil. Indigenous lifeways, such as pastoralism, and integrated landscape management approaches have enabled soil carbon capture in fragile desert ecosystems and montane areas, as well as in abundant, verdant agroecological zones. The Christensen Fund's support for integrated, well-being-based food systems has allowed Indigenous Peoples to maintain their lifeways and access to territories while stewarding more than 80% of the remaining terrestrial biodiversity. This intricate systems of knowledge and practice support productive working landscapes and create models of healthy soils to observe and learn from as we collectively cope with a changing climate. Support for organizations such as AgroEcology Fund to a new multi-organization collaboration looking at the role of pastoralism in soil and landscape health and climate mitigation, is helping to support continued maintenance of healthy soils as both a mitigating and an adaptive strategy, while working towards healthy communities with robust, local economies. The Christensen Fund supports work in several distinct areas of the world, the African Rift Valley, Central Asia, Melanesia, Northwest Mexico and the San Francisco Bay Area and at a Global level bolstering networks, policies and institutions that enable Indigenous Peoples and local stewards

to thrive. Networks such as Zan va Zamin in Tajikistan, the Indigenous Partnership for Agrobiodiversity and Food Sovereignty, or Kivulini Trust in Kenya, working on myriad levels at home or internationally to create healthy soils and cultures for the future of food.

The Climate and Land Use Alliance (CLUA)

Global, Brazil, Indonesia, Mexico & Central America

The Climate and Land Use Alliance supports policies, practices, and partnerships that halt and reverse forest loss, advance sustainable land use and development, and secure the rights and livelihoods of indigenous and forest communities. The strategy on natural carbon capture aims to increase the role of forests and lands as carbon sinks, while ensuring forests retain ecosystem, livelihood and other values for local communities. Member Foundations—[ClimateWorks Foundation](#), [the David & Lucile Packard Foundation](#), [the Ford Foundation](#) and [the Gordon and Betty Moore Foundation](#)—awarded \$470 million in grants between 2010 and 2018. Aligned member foundation include [Good Energies](#) and the [Margaret A. Cargill Philanthropies](#).

The McKnight Foundation

United States (Mississippi River)

Healthy soils and soil carbon are key components of McKnight’s Mississippi River program grant-making. Soil health has developed a remarkable amount of traction with Midwest farmers in a way that water quality protection does not, largely because soil health practices often provide farmers with better yield and contribute to greater resiliency. Soils also provide an inclusive frame; large monocultural operations can benefit from better soil health practices just as a small regenerative farms can.

McKnight’s River program has multiple grant-making strategies for advancing soil health. First, we support organizations working directly with farmers on education, promotion, and incentives. This includes Practical Farmers of Iowa, Sustainable Farming Association, and Land Stewardship Project. Second, we support organizations that advocate for appropriate state and federal policy. This includes the National Sustainable Agriculture Coalition, the Meridian Institute, Natural Resources Defense Council and National Wildlife Federation. And finally, we support organizations that are driving for soil health principles to be incorporated into agricultural supply chains. This includes organizations that collaborate with corporate interests to strengthen soil health commitments, such as the Noble Institute and Sustainable Food Lab, and organizations that use advocacy to chasten corporations that should be doing more, such as Mighty Earth.

United States (Impact Investing)

In 2014, the McKnight Foundation committed to investing \$200 million (10 percent of its \$2 billion endowment) in strategies that align with McKnight’s mission. These investments generate financial return, meet our fiduciary duty, drive program learning, and deliver environment and social returns. One investment category focused on high impact investments that deliver a higher level of impact in McKnight’s priority areas for environmental and social change with Midwestern BioAg (MBA serving as an example with a \$5 million direct equity investment that began in 2016). MBA is a farmer-centric

business that helps producers grow yields, increase profits and improve soil health. For many years the agricultural input business has been relatively static, controlled by several large corporations. MBA is operating in an interesting market niche providing both appropriate yield and environmental benefits with an approach that can work for both organic and large-scale conventional farming. Other investments help grain farmers grow a more productive and sustainable crop, by creating sustainable fertilizer from renewable biological materials collected from manure treatment systems at the company's hog farms. The fertilizer provides the benefit of a more controlled release of nitrogen while reducing GHG emissions and producing a smaller environmental footprint.

Africa and South America: Collaborative Crop Research Program (CCRP)

The CCRP funds collaborative and participatory research centered on ecological agriculture in 10 countries in Africa and South America. Along with the research, we support capacity strengthening and convening for the research collaborators that include university and national research program scientists, NGO and extension professionals, and farmers. Soil health serves as a key feature of a productive and regenerative agriculture and thus we have local, regional and global efforts that focus on soil health research with smallholder farmers that can inform at all levels. Included below are a few examples of projects advancing soil health efforts.

Project title: Building and assessing soil health in smallholder systems

Lead organization: Colorado State University, Fort Collins, Colorado

Project description: The project focuses on developing a global 'tool kit' for agroecological approaches and indices for sustainable soil management, with particular emphasis placed on projects and partners within the Collaborative Crop Research Program (CCRP). This work includes both methodologies and instrumentation for evaluating soil quality in situ as well as development of a framework to better understand residue and nutrient management options and limitations across diverse smallholder contexts. This builds upon existing international efforts around the globe centered on soil health. This project created a team that works with grantees from all three regions in the CCRP program by providing support around issues of agroecological management and soil health, with the aim of strengthening smallholder livelihoods and farming system resilience. Since 2017, the soil health team has aided multiple NGOs, researchers, and farmers to improve their understanding of healthy soils and increased the participants' capacity to conduct independent soil health assessments. The ability of smallholder farming households to maintain soil health and farm productivity is highly context-dependent, reflecting the biophysical environment as well as local, social, and economic conditions.

Project title: Improving Soil Health through a Global Community of Practice and Continental Action Plans

Lead organization: Meridian Institute, Washington, DC

Project description: This project engages a broad range of individuals and institutions that are required for systemic change, including landowners, farmers, ranchers, land managers, supply chain companies, food companies, insurance companies, investors, researchers, policymakers, extension practitioners, and other organizations that can drive practical application of soil health tools and technologies. This project effectively creates a Community of Practice (CoP) that focuses on enhancing connectivity between soil health tools and service developers and a range of direct and indirect users and beneficiaries. This project brings together soil health practitioners and researchers from the USA and Africa to share knowledge and improve soil health. The project's genesis comes from requests from the field for better information and action sharing for greater impact. The ultimate objective of

the CoP is to contribute to and enhance efforts to improve and track soil health. Members share tools, models, theory, and practice. This results in improved collaboration, greater alignment, and advancement of research and practice. The CoP's focus on soil health is essential for water retention and nutrient cycling, crop productivity, erosion reduction, water quality, healthy crops, resilient farms, and carbon sequestration.

Project title: Women production systems

Lead organization: FUMA Gaskiya, Maradi, Niger

Project description: The project aims to enhance smallholder farming families' well-being in Niger through the continued development of successful participatory research with farmers. Now on its third phase, this project plays an integral role in agricultural research for development, and enables FUMA to contribute more efficiently to food and nutritional security of smallholder farming families, especially women farmers, in two regions of Niger, Maradi and Tillabery. In collaboration with over 1700 farmers in 21 unions, this project has disseminated the use of a new technology commonly referred to as the seed ball technology. The seed ball technology is a form of seed pelleting that consists of wrapping seeds with necessary nutrients it needs to grow, including wood ash from cooking places and chemical fertilizers in micro-dosages, to enhance early plant establishment and plant development. This is a low-cost option that has proven to be particularly beneficial among female farmers in the West Africa region. The project continues to collect data, working with a large set of farmers to explore technology options available at the farm level such as soil fertilization with urine, wood ash or compost, and partial weeding.

Project title: Drylands Farmer Research Network (FRN)

Lead organization: University of Eldoret, Eldoret, Kenya

Project description: Throughout Sub-Saharan Africa, dryland regions are experiencing widespread environmental degradation and increased frequency of famine and armed conflict due to diminishing resources, especially of pasture and water. This project works with farmers and NGOs to improve ecosystem functioning at both farm and landscape levels. Working with farmers to research suitable options for diversifying crop production with more climate-resilient crops, the project emphasizes simultaneous improvement of soil fertility and productivity along with profitable water use. Much attention is paid to empowering the community to gain skills and agency for implementing sustainable soil-water conservation strategies, including simple physical control measures and integration of legume-cereal-livestock-agroforestry strategies. At the start of this project, gullies were a major problem faced by the community. Since the start of the project, most of the gullies have shown recovery measured by growth of vegetation and reduction of water feeding into the gullies. Sand dams have been effective in the collection of soil sediments and slowing down water speed thereby increasing water percolation and recharging water table. The county government has identified the project area as a model area that in the future will be used by other farmers as a benchmark to learn landscape rehabilitation.

Project title: Best Bets

Lead organization: Lilongwe University of Agriculture and Natural Resources, Lilongwe, Malawi

Project description: The main goal of the current phase of this project is to improve crop productivity, soil health, and build resilient agricultural systems through identification of context specific integrated soil fertility management options for targeting different biophysical and social economic niches. This project accomplishes its goal by supporting more productive, diversified and resilient agricultural systems; testing farmer-centered experimentation models for improved sustainable agriculture; and increasing legumes in diets particularly of under five children and pregnant women. To develop

context specific options on performance of diversified legume-maize systems, over 250 farmers have been working on multi-environmental trials. Progress has been made towards generating information on performance of legume-maize cropping systems in different environments and factors and documented factors that contribute to heterogeneity in performance of legume options. The effect of sole and doubled up legumes on active soil carbon has been documented.

Project title: Forage and Fallows: Expanding the impact of improved fallows and landscape management for soil fertility and ecosystem services

Lead organization: Grupo Yanapai, Lima, Peru

Project description: As demands on agriculture continue to increase, new strategies of smallholder farmers must ensure sustainable intensification of cropping and grazing practices, while promoting resilience to climate change and maintaining soil quality and function. Fallows are an important feature of Andean agriculture that are critical to soil regeneration. The project promotes future agroecological innovation by working with local schools to develop new strategies and curriculum for promoting the responsible management of soils and agroecosystems.

Project title: Climate Early Warning Farmer Research Network in Bolivia

Lead organization: University of Missouri, Columbia, MO

Project description: This project establishes and evaluates an integrated climate-planning tool based on local knowledge and scientific knowledge to help farmers make agricultural planning decisions based on improved forecasting tools used to predict short- and medium-term meteorological conditions. This tool reduces the vulnerability of smallholders to climate variability and change. In general, the onset of rains during the last 10 years in the Bolivian Highlands has been later. While the date has varied by location, the rains have come roughly one month later than they did 20-30 years ago. At the same time, annual rainfall has not changed meaning that more intense rains are falling in a shorter period. These results coincide with the perceptions of farmers in eight communities in the region. This project has provided forecasts to local farmers to help them decide planting and harvesting dates, as well as helping farmers avoid severe frost. By identifying patterns in the changing weather, this project is helping farmers in their adaptation strategies.

V. Kann Rassmussen Foundation

Global (Research)

Project title: Enhancing Agronomic Productivity by Accumulating Humus Carbon

Lead organization: Carbon Management and Sequestration Center, The Ohio State University

Project description: Agronomic productivity depends on natural factors (e.g., ecoregion, climate, soil type), and on management factors such as choice of crop species and varieties, managerial inputs (e.g., mineral fertilizer, pesticides, water), soil management (e.g., cover cropping, tillage), and soil health. The humus carbon (C) or soil organic carbon (SOC) stock is central to soil health and, thus, agronomic productivity as it supports critically important soil-derived ecosystem services (ESs). Globally, the yields of corn (*Zea mays* L.) and wheat (*Triticum aestivum* L.) are on average higher from soils with higher concentrations of SOC but this yield increase levels of about 2% of SOC in the root zone (Oldfield et al. 2019). In conventional systems, beneficial effects of SOC are easily masked by inputs of fertilizers and other amendments. In contrast, SOC stocks are more important in organic agriculture (OA) systems as those rely heavily on nutrient supply from SOC mineralization. Organic amendments such as animal manure have positive long-term effects on SOC stocks, soil fertility, soil water retention and plant available water. Thus, accumulating SOC or humus C enhances agronomic

productivity in both conventional and OA systems. The SOC sequestration rates range between 0.25 – 1.00 Mg SOC ha⁻¹ year⁻¹ under conventional management, and are estimated to be 0.45 Mg SOC ha⁻¹ year⁻¹ higher in the top soil under OA (Gattinger et al. 2012).

Project title: Carbon Sequestration in Agro-Ecological Systems: A Feasible Climate Mitigation and Sustainability Strategy?

Lead organization: Solano Land Trust

Project description: Compost amendment on grazed grasslands improves carbon storage in soil and prevents atmospheric losses of terrestrial C which can help mitigate the effects of climate change while enhancing agricultural and ecological productivity. The Solano Carbon Project is a multi-year study of grazed rangelands in northern California, to which locally sourced green-waste compost was applied in 2016. The project evaluates the potential for atmospheric carbon sequestration in rangeland soils as a viable climate mitigation and green-house gas reduction strategy using the American Carbon Registry quantitative methodology for accounting and assessing carbon sequestration and avoided GHG emissions related to Compost Additions on Grazed Grasslands. The project advances our understanding of the economic benefits for land managers to implement sustainable agricultural practices and build climate resiliency, and identifies the ecological factors that drive ecosystem carbon storage, increased carbon stocks and other ecosystem services. By expanding market opportunities and incentives for private landowners to participate in a carbon market, the beneficial impacts of these practices could be increased significantly, and extended to include both private and protected lands.

Project title: Soil Carbon Sequestration on Working Lands

Lead organization: The Silver Lab, University of California, Berkeley

Project description: The Silver Lab seeks to determine the biogeochemical effects of climate change and human impacts on the environment, and the potential for mitigating these effects. Our current research focuses on the potential to help mitigate climate change through improved management of working lands. Of particular promise is the use of composted organic waste (green waste, livestock waste, and food waste) as a soil amendment on rangeland and cropland ecosystems. Our research has shown that diverting these materials from the waste stream reduces greenhouse gas emissions, while lowering landfill and manure loads and reducing waste-associated water and air quality problems. We found that composted soil amendments sequester soil carbon, increase plant growth for farmers and ranchers, and improve soil water holding capacity. We use long-term, well-replicated experiments across different bioclimatic zones and management approaches. Thus far we have accumulated a decade of results. Related work is measuring and modeling the carbon and greenhouse gas lifecycle of waste to compost to soils. In collaboration with local and state agencies, landowners, and land managers we are evaluating the ecology and economics of waste capture and utilization, farmer co-benefits, and the potential role of these in climate action planning.