Healthy Soils, Healthy Communities:
Opportunities to Bridge Environmental Justice and Soil Carbon Sequestration

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Executive Summary

In 2016, global atmospheric CO2 concentrations passed 400 ppm. To get back to the safe zone, generally recognized as below 350 ppm, we have to pull carbon out of the atmosphere. Safely in the soil, carbon is beneficial – it helps soils hold water and nutrients, resist drought and prevent erosion. By one estimate, the world's agricultural soils have lost over half their original carbon. If those soil carbon stocks were regenerated, by one account they could offset up to 15% of global greenhouse gas emissions.[1] The French Ministry of Agriculture has suggested an annual increase in the organic matter of the world's soils of just 4 percent would offset all global GHG emissions.[2] We need to begin managing soils for the carbon cycle – putting soil carbon to work in our cities, ranches and farms.

Soil carbon work is also an opportunity to address long standing environmental justice issues – including water and air pollution, access to food and urban green space, job creation and support for small scale farmers . Strategies to both further environmental justice and capture carbon will depend in large part on how, to what purpose, and for whom we manage our soil.

We have to connect the dots between the carbon cycle and the work to build healthy, just communities. Soil carbon work is a part of a broader just transition to a carbon-free economy. That transition starts with organizing in frontline communities, and making sure that environmental justice has a place at the table at the very beginning of any policy or program development process. Policymakers need to see the economic and social benefits of healthy soils. California's new Healthy Soils Initiative is an opportunity to bridge environmental justice and soil carbon work, to try new approaches and create a holistic approach.

This report aims to expand a conversation between environmental justice, climate and sustainable agriculture communities. The report describes interviews and initial conversations with organizations around the state working at the intersection of soil health and environmental justice, from California's San Joaquin Valley to Los Angeles and the greater Bay Area.

Soil Health as Environmental Justice in the San Joaquin Valley

Managing for the carbon cycle would have enormous implications for how we grow food and the health impacts of our food system. Some soil carbon work on California farms and ranches is also environmental justice work. Our interviewees spoke about seven areas of overlap between soil health and environmental justice in the San Joaquin Valley, though there are certainly more:

- Soil organic matter can reduce soil fumigant emissions – Pesticides applied directly to soils form short-lived climate pollutants, and contribute to air and water pollution. Increased soil organic matter can reduce fumigant emissions and, reduce the need for fumigants in the first place.
- Soil organic matter slows water contamination – Synthetic fertilizer and pesticides have contaminated drinking water in the Central Valley over the last 70 years. Soils higher in organic matter leach fewer pollutants, including nitrates and pesticides. Soils high in organic matter also require less synthetic fertilizer to produce a crop. Using compost instead of synthetic fertilizer can reduce nitrogen loads in the Valley. Over time, increased soil organic matter and riparian restoration could help reduce groundwater contamination.
- Composted manure from dairies could be a source of soil organic matter – Concentrated manure from industrial dairies is a major local air quality and water quality issue. If that manure were composted, it could become a source of valuable nutrients and soil organic matter instead of a pollutant, and help displace the use and manufacture of synthetic fertilizers.
- Composting farm waste could prevent black carbon emissions – Instead of burning orchard waste, another local air pollutant, mulches and composted farm waste could be a source of soil organic matter for farms and rangelands.
- Rural workforce development and wildfire management – From the Conservation Corps, to ecological restoration, nursery stock production, wetland management and fire prevention, there is a lot of work to do to conserve and increase terrestrial carbon on public and private lands. This is an opportunity to both train and employ young people with low-to-moderate incomes and in communities of color in natural resource and agricultural management.

- Carbon-friendly practices can support small scale and immigrant farmers – Public support for carbon-friendly practices could help make small to mid-scale and immigrant farmers more resilient and boost their bottom line through a combination of financial support for carbon-friendly practices and more stable land access. These programs will have to be accessible to small scale farmers and take into account chronic issues around access to land, credit and technical assistance.

- Healthy food systems in the San Joaquin Valley – Soil carbon is part of a much larger project to re-design food systems that better support people and the environment in the San Joaquin Valley.

Greening Urban Landscapes

Urban ecology also has a significant impact on the carbon cycle – and on how the carbon cycle is managed and understood. Cities are where the vast majority of people interact with the environment, learn about natural resources and engage in the democratic process that governs natural resource use. We wanted to explore the urban connections to healthy soils and how healthy soils fit into broader efforts to create a healthy built environment and regenerative urban landscapes?

A justice approach to healthy soils in urban communities might yield important gains in five areas:

- Just transitions and job creation - Many urban organizations view their food systems work through the lens of a transition to a more green and just economy and a healthy urban environment, in general. There is tremendous potential for job creation and local economic development through creating a more carbon-friendly food system.

- Urban waste recycling and composting – Food and other organic wastes from cities can be an excellent source of compost for farms and ranches. Composting diverts waste, prevents methane emissions from landfills and recycles carbon. Both large scale and decentralized composting operations need support for new infrastructure to scale up.

- Urban agriculture and forestry – Urban farms grow healthy soil, healthy food and educated, engaged citizens with a stake in sustainable resource management. Efforts at restoring urban forests and streams help create the natural mosaic required for resilient urban communities.

- Creating more informed citizens engaged in natural resource management – With so many California residents in cities, parks, urban farms, green belts and other open space is where the majority of residents interact with nature. Maintaining these spaces is one way of building the political will and democratic engagement with natural resources necessary for a more just transition to healthy regional economies.

- Brownfields and green space – Community organizations in cities are working hard to restore toxic brownfield sites, increase access to green space, and create a healthier built environment. These spaces are a significant platform for restoring soil and engaging urban community organizations in both near and long-term change.

Conclusions

This report points to a vision to integrate healthy soils into a new model for community investment and development – a model that connects rural and urban development, includes youth empowerment, green jobs and environmental health, and regenerates natural resources. It is a vision that includes a plurality of viewpoints on natural resources and sees urban areas as important ecologies as well. Going beyond specific projects for Greenhouse Gas reduction, a justice approach to healthy soils is part of a broader push to regenerate natural resources and build healthy communities.

Connecting the dots between pollution, healthy soils, healthy communities and their impact on the carbon cycle can help set priorities for climate work. The question then, is 'Which opportunities can create an effective, inclusive and equitable impact?' Answering this question will require further dialogue, research, and pilot projects to test some of the promising ideas identified in this report. The importance of taking a broad-based approach and working with key partners in a participatory way cannot be overemphasized. Within this framework, we consider several next steps:

Community organizations and environmental justice advocates:

- Convening impacted communities and environmental justice groups to set priorities, goals and objectives
- Convening with government officials to explore short term policy priorities and potential synergies

Government and private funders:

- Growing youth empowerment through education, workforce training, and employment in fire prevention and land restoration programs
- Designing funding programs tailored for Environmental Justice and healthy soils, and considering which funds already achieve these goals that could be re-purposed;
- Streamlining funds for urban greening and green agriculture;
- Funding research on specific contributions of agricultural practices to carbon storage, reducing environmental health related pollution and creating measurable local health benefits
- Identifying the areas with highest groundwater pollution and other pollutants for soil carbon work

Collective efforts:

- Further research and analysis into the specific strategies effectively integrate soil carbon sequestration and environmental justice, with an eye for how to quantify impact
- Ensuring the public is educated on the carbon cycle and its impact on water, soil, and air quality, and farming, ranching and urban communities

Introduction

> "Land, then, is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals."
>
> -Aldo Leopold, 1949

Our soils, our climate and our communities are linked through a vibrant web of ecological interactions. Ever since the Neolithic period, the flow of carbon from sky to plant, to soil and eventually to sky again, has been mediated—and increasingly disrupted—by human activities.[3]

The massive increase in emissions of greenhouse gases over the last half-century has ushered in an unprecedented global crisis. While future planetary scenarios are still being hotly debated, the reality of global warming is being felt today, on the ground, particularly by farmers and rural communities.

We urgently need to slow the flow of CO2 into the atmosphere and draw carbon into the soil. This is not an abstract social task. Much of the work will need to be done on the ground by the very communities being most impacted by the physical effects of climate change, such as drought and falling water tables. These are the same communities suffering from the negative environmental consequences of one of the main drivers of global warming: industrial agriculture. Rebalancing our complex relationship with the environment is a formidable challenge, but it is especially so for communities whose environmental health has been compromised by decades of pollution, degradation, contamination, poverty, food insecurity, and diet-related disease. These same communities have the most at stake in reversing climate change. They are also well positioned to participate in the urgent task of capturing carbon in urban and rural ecosystems.

Strategies to improve environmental health by capturing carbon in the soil will depend, in large part, on how, to what purpose, and for whom we manage our soils. Getting soil management right, effectively and equitably, will require the participation of all parties—including those historically left out of conversations on environmental and land management. This report aims to expand a conversation that engages communities on the ground with the policymakers and practitioners seeking to capture carbon to improve soils and environmental health in California. The report describes initial conversations with organizations around the state working at the intersection of soil health and environmental justice, from California's Central Valley to Los Angeles and the greater Bay Area.

What follows is a picture of the grassroots work that has potential to both store carbon and support environmental justice.

Why Healthy Soils?

In 2016, global atmospheric CO2 concentrations passed 400 ppm – the last time CO2 levels were this high, humans did not exist. To get back to the safe zone,

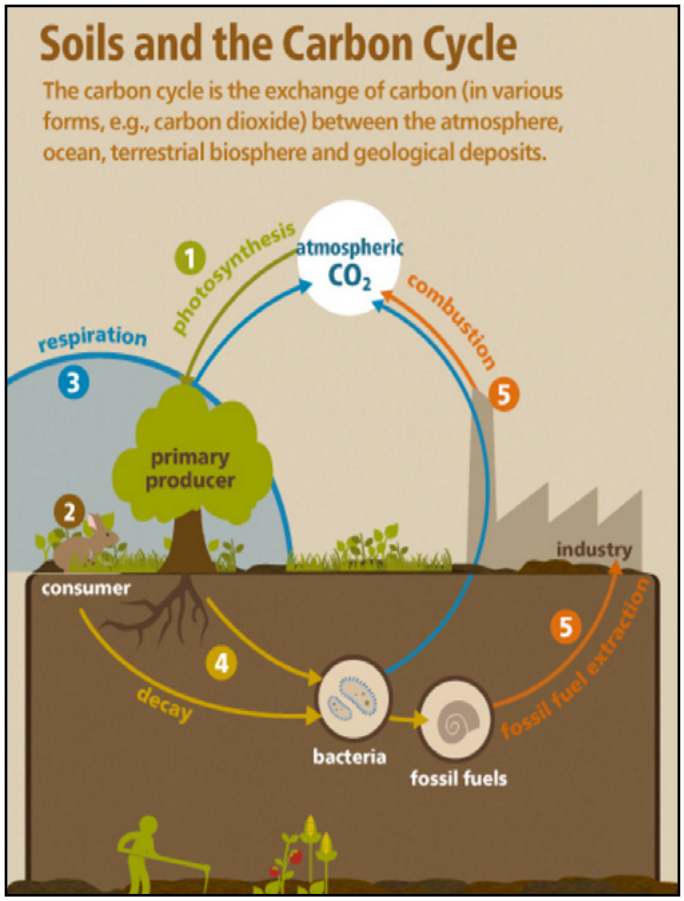
generally recognized as below 350 ppm, we have to pull carbon out of the atmosphere. Carbon can either help us or hurt us, depending on where it is. Safely in the soil, organic carbon is beneficial– it helps hold water and nutrients, resist drought and prevent erosion. By one estimate, the world's agricultural soils have lost over half their original carbon stock. If those soil carbon stocks were regenerated, by one account they could offset up to 15% of global greenhouse gas emissions.[4] The French Ministry of Agriculture has suggested an annual increase in the organic matter of the world's soils of just .4 percent would offset all global GHG emissions.[5]

Carbon, in the form of soil organic matter, is an essential ingredient for healthy soils – it is a key part of the nutrient cycle.[6] Soil organic matter is all the living and once living materials in soil, from decomposing wood and leaves to manure, bacteria and fungi. Healthy carbon-rich soil provides a host of other benefits. Soils with more carbon form more stable aggregates, reducing erosion.[7] Organic matter also reduces the persistence and mobility of toxins and pesticides in the soil, and suppresses pathogens.[8] Healthy carbon rich soils are more likely to support crops in a drought – high levels of carbon and stable aggregates increases the capacity of soils to hold water.[9]

Good land management can restore soil carbon levels and increase soil organic carbon over the long term.[10] In particular, plowing less, planting perennials and cover-crops, rotating crops, adding mulches or crop residues and using composts can increase soil carbon and slow the rate at which soil organic matter decomposes and returns as carbon dioxide to the atmosphere.[11]

But these practices are not only biological, they are social. Healthier soils will affect the communities that depend on them. As Dr. D'Artagnan Scroza of Inglewood's Social Justice Learning Institute told us, "The way I see it, a community's success depends upon the way it treats the soil and treats its life."

There is a huge opportunity to shift the way we think about natural resources to boost soil carbon. Government agencies from the Natural Resources Conservation Service to the National Parks; private landowners, farmers, and ranchers; scientists and community organizations, all have their hands on the levers of the carbon cycle, whether knowingly or not. Wildfire prevention efforts can help keep carbon in the ground and in the forest. Restoration efforts on public lands, riparian areas, and wetlands affect carbon storage. Water management choices can also affect soil carbon. Many agencies are beginning to manage for soil carbon. The Natural Resources Conservation Service is piloting carbon storage projects on rangelands in California and sharing the cost with farmers for soil carbon-building practices like cover cropping, windbreaks, and reduced tillage. Several companies have policies supporting



Source: FAO 2015

preferential buying from producers actively engaged in increasing organic carbon in their soils, cities are recycling green waste into new sources of compost for farms and ranches, and new funding sources are supporting urban greening, tree planting, and open space all in the name of greenhouse gas reductions.

California recently created a new program to support agricultural practices that increase organic matter in soils, and it's an environmental justice opportunity. The California Healthy Soils Initiative will provide $7.5 million dollars in financial incentives for farmers and ranchers to adopt these practices with funding from California's Greenhouse Gas Reduction Fund (GGRF), in 2017. The Initiative could also fund research, education and technical support to farmers and ranchers. A collection of organizations sponsoring the Healthy Soils Initiative recommend that at least 25% of projects should benefit 'disadvantaged communities', in keeping with SB 535 – the state law requiring funding for environmental justice projects under the state's Greenhouse Gas Reduction Fund (GGRF). There is both a need and an opening for work at the intersection of healthy soils and environmental justice.

New climate policies can support healthy soils and healthier communities. Many of the most impacted communities in California suffer the health consequences of air and water polluted by agriculture.

Some of the most productive agricultural areas in the state are food deserts – with few retail outlets where fresh and healthy food is available. Unfair labor conditions on large farms produce concentrated areas of poverty. In urban areas, environmental justice groups are organizing to clean up contaminated soils, create more green space, build community gardens, and work towards healthy food access. Many look to the food system to create jobs. While most groups do not think or talk about their work in terms of soil health, conversations with community leaders in both rural and urban areas reveal space where work on healthy soil can support deeper changes towards more just, healthier communities. We begin to outline that landscape of possibility here.

Starting the Conversation – Interviews and Initial Research

We did an initial round of interviews with well-respected environmental justice leaders whose work touches in some way the intersection of soil and environmental justice. Representing organizations from Los Angeles, the Greater Bay Area and the San Joaquin Valley, these groups reflect the personal networks of the authors and some areas of environmental justice concern in the state. What follows does not represent the full breadth of environmental justice work in food and agriculture. Important climate justice work is happening in Native communities, in forests and watersheds, and in cities and geographies not covered in this piece. Instead, we wanted to start a conversation with leaders with whom our relationships were deep to get a broad picture of the current landscape of this work and the potential for healthy soils work to support healthy communities into the future.

In every case we could, we visited these organizations in person, witnessed the creativity and dedication of their staff, and saw the impact of the work first hand. We designed the interviews to elicit stories and big visions. Interview questions were semi-structured and open-ended. We asked our interviewees about their perspectives on efforts to restore soil health and build soil carbon while simultaneously restoring social systems. We also asked about their work for climate justice, and the gaps in the conversation between agriculture, climate and environmental justice. Finally, we inquired about the potential for new state resources to impact their work in this area, what their vision is for their community, and how it might be supported in climate policy. We summarize the results of those interviews below.

Combined with background research on climate and environmental health, these stories are a map to explore the connection between healthy soils and healthy communities going forward.

Organizations and Interviewees

- Brent Newell and Caroline Farrell
  Center on Race, Poverty & the Environment
- Jenny Rempel
  Community Water Center
- Phoebe Seaton
  The Leadership Counsel for Justice & Accountability
- Janaki Jagannath
  Community Alliance for Agroecology
- Byron Ramos-Gudiel
  Communities for a Better Environment
- Clare Fox
  Los Angeles Food Policy Council
- Parin Shah
  Asian Pacific Environmental Network
- D'Artagnan Scorza
  Social Justice Learning Institute, Inglewood California
- Doria Robinson
  Urban Tilth, Richmond California
- Michael Martinez,
  L.A. Compost

Part I: Environmental Justice and Soil Carbon Capture in the San Joaquin Valley

Soil carbon work has enormous implications for the health impacts of our food system. Take a drive down the CA-99 through California's San Joaquin Valley in the summer. The sky is a dusky brown. Torn up almond orchards dot the highway and dead trees are piled high, waiting to be burned in the field or carted to an incinerator or landfill. The San Joaquin Valley has some of the most concentrated land ownership in the state and is the region that suffers the greatest cumulative burden of pollution sources. Since the dawn of settler agriculture in California's San Joaquin Valley, soil microbial communities and human communities have felt the burden of agricultural intensification and mechanization.

While California was emerging as the number one grower of grapes, citrus, plums, peaches, and other tree fruit, migration from the Dust Bowl in the

South and Midwest led many white immigrants from Oklahoma, Arkansas, etc. to settle in California to do standing labor like picking and processing of fruit. These people often built by hand many of today's unincorporated communities that suffer from environmental injustice. Housing settlements are supplied by vulnerable wells and suffer a lack of basic infrastructure such as traffic signage, sewer lines, and transit. The Valley has been enriched by successive waves of immigrants working in the fields: Chinese, Japanese, Filipinos, Southeast Asian, Punjabi Sikh, Pakistani, Italian, Swiss, Azorean Portuguese, Basque, Swede, German, Dutch, Assyrian, and Yugoslavs. Today, largely Latino communities struggle with the fallout of this historical trajectory of agricultural development and intensification. Now the agricultural landscape is shifting again, away from small-tract fruit production to large-scale nut orchard crops such as almond and pistachios, which require far less labor. People are left behind in communities with poor water, air, and a declining job market. The vast majority of the San Joaquin Valley qualifies as a 'disadvantaged community' subject to both high levels of poverty and pollution.

Some environmental justice work is soil carbon work as well. Our interviewees spoke about seven areas of overlap between soil health and environmental justice in the valley, though there are certainly more:

- Soil organic matter reduces soil fumigant emissions: Pesticides applied directly to soils form short-lived climate pollutants, and contribute to air and water quality issues. Increased soil organic matter can reduce fumigant emissions and the need for fumigants.

- Soil organic matter slows water contamination: Synthetic fertilizer and pesticides have contaminated drinking water in the Central Valley over the last 70 years. Soils higher in organic matter leach fewer pollutants, including nitrogen and pesticides. Soils high in organic matter require less synthetic fertilizer to produce a crop, and using compost as fertilizer can reduce the total nitrogen load in the Valley. Over time, increased soil organic matter and riparian restoration could help reduce groundwater contamination.

- Composted manure from industrial dairies could be a source of soil organic matter: Concentrated manure from industrial dairies is a major local air and water quality issue. If that manure were composted, it

Almond fields in spring near Tranquility, CA

could become a source of valuable nutrients and soil organic matter instead of a pollutant, and help displace the use and manufacture of synthetic fertilizers.

- Composting farm waste could prevent black carbon emissions: Instead of burning orchard waste, another local air pollutant, mulches and composted farm waste could be a source of soil organic matter for farms and rangelands.

- Rural workforce development and wildfire management: From Conservation Corps, to ecological restoration, nursery stock production, and fire prevention, there is a lot of work to do to conserve and increase terrestrial carbon on public lands. This is an opportunity to both train and employ adults and young people with low-to-moderate incomes and in communities of color in natural resource and agricultural management.

- Carbon-friendly practices can support small scale and immigrant farmers: Public support for carbon-friendly practices could help make small scale and immigrant farmers more resilient to climate change and drought and boost their bottom line through a combination of financial support for carbon-friendly practices and more stable land access. These programs will have to be accessible to small scale farmers and take into account chronic land access issues.

- Healthy food systems in the San Joaquin Valley: soil carbon is part of a much larger project to re-design food systems that better support people and the environment in the San Joaquin Valley. Foods produced in carbon-rich soils have higher nutritional content as well.

Agriculture in the Valley is productive, but the way we farm contributes both to loss of carbon to the atmosphere and the poor health of some of the state's most vulnerable residents. CalEnviroScreen, the tool used to designate California communities that qualify for funding under the state's environmental justice law, was designed to identify the most cumulative impacted census tracts in the state based on a range of environmental and social vulnerability factors. The tool maps unacceptable levels of pollutants in the valley, including PM2.5 (fine particulate matter or dust that contributes to asthma and other respiratory illness), ozone, drinking water contaminants, pesticide contamination, threats to groundwater, and impaired water bodies. Agriculture as an industry contributes directly to these environmental health disparities. Groundwater is contaminated from 70 years of synthetic fertilizer and pesticide use, while air quality is affected by diesel from the trucking of agricultural products, the burning of orchard waste, and other noxious emissions from manure, volatile organic compounds from pesticides, and nitrous oxide from synthetic fertilizers. Further, farmworkers' wages are so low that food insecurity is rampant; the Fresno Community Food Bank serves 280,000 people a month – over a quarter of the population of Fresno County. In a 2005 survey, 45% of farmworkers in Fresno County were food insecure.[12]

But these health effects of agriculture also represent opportunities. The Community Alliance for Agroecology, a coalition of several environmental justice groups, including the Center on Race, Poverty & the Environment, the Community Water Center, and the Leadership Counsel for Justice & Accountability, has been organizing to create a framework to connect soil carbon work to environmental justice in the San Joaquin Valley.

In a sentiment echoed by several interviewees, Alliance member Caroline Farrell of the Center on Race, Poverty & the Environment (CRPE) in Delano, California told us, "This is climate policy's opportunity to reimagine what agriculture can be. Thinking about how we manage the waste which creates so much air pollution burden, as well as water quality degradation potential, how do we manage that in a way that is beneficial to local communities?"

Solutions in the Carbon Cycle

Soils are closely tied to air and water quality. Take soil fumigants for example—the pesticides form a gas when applied to the soil to control pests like nematodes, fungi, bacteria, and insects. The gases move from soil to the air, and can be acutely toxic to workers and nearby communities.[13] Soil fumigants also emit volatile organic compounds (VOCs), which react with other compounds in the air to form ground-level ozone and fine particle pollution—pollutants linked to high asthma rates in children. While not regulated as short-lived climate pollutants in California, the VOC emissions from soil fumigants contribute to ground level ozone, an important short-lived climate pollutant. Soils higher in organic matter are better able to absorb and retain compounds like fumigants, reducing emissions. Beneficial soil organisms are more active in soils with high organic matter, which can make soils less susceptible to pests overall. Increased soil organic matter reduces both the need for fumigants and fumigant emissions.[14] Soils higher in organic matter hold on to nutrients better as well, and can be an effective strategy for reducing groundwater pollution. Practices like cover cropping, hedgerows, riparian restoration, and composting can reduce the transfer of pesticides and nitrates from synthetic fertilizer to groundwater.[15] Composting and cover cropping also reduce the need for synthetic

fertilizers. Recycling manure from the Valley into compost to displace fertilizer use would significantly reduce the total nitrogen loading in the Valley, while maximizing resource use and helping to build soil carbon. Increasing water-holding capacity in soils by increasing soil organic content lessens demand from groundwater and surface water needed by communities and the environment.

Nearly every person we interviewed remarked on opportunities within the dairy industry. Dairy is California's most valuable agricultural product. The San Joaquin Valley produces over 80% of the state's dairy products.[16] Concentrated manure is a major local air quality issue. In addition to methane (a greenhouse gas 25 times more powerful than carbon dioxide), the dust coming off dairies contributes to particulate and ground-level ozone pollution. The State of California subsidizes the cost of methane digesters that convert methane into usable biogas or electricity on dairies. While this is an important development for climate policy—over half of California's methane emissions come from the dairy industry[17]—to date, it does little to address local pollution. One leader worried, "But there's a question coming from some of the more community-based folks about, are we just creating a monster? If the solution is to put these digesters in, and they are only economically feasible with large scale and with massive amounts of manure, are we really solving a problem or are we institutionalizing one?" The digester issue ties into healthy soils, she said, because those millions of tons of manure could be a good source of nutrient-rich compost if co-composted with other materials. She expressed frustration with state policy that could allow investments in digesters to be considered a 'benefit' to disadvantaged communities under California's environmental justice law, SB535, potentially leaving less cash for projects that have a direct positive impact. The digesters have no direct environmental health impact for the community, she said, "and in some instances if the digester is adjacent to your house and it's combusting, it's not a benefit, it's a harm. There's more particulates right next to you. Is there a better solution for how we're dealing with dairies? Maybe we should be grazing more instead of the feedlot operations that we have for dairies."

Two of our interviewees pointed to the opportunity to re-use orchard waste for composting instead of burning fruit and nut trees at the end of their productive lives. What could be a source of carbon for composting ends up as black carbon, Jagannath says. "In the Central Valley there is [sic] 350,000 hectares of almonds and nut production. Normally the life cycle of the conventional almond tree is 25 or 26 years. After that they yank it out and pile it up. They either light it on fire and send all that precious carbon into the atmosphere as black carbon… or send it to biomass incinerators, which were subsidized by the state government." The California Air Resources Board is researching incentives for alternative waste management strategies for orchards, including chipping, grinding and applying woody biomass back on farm fields. These woody products could be a source of carbon for mulches or compost.

Addressing both water supply and water quality concerns requires long-term thinking about shifts in agricultural practices. Many of the changes that a greater focus on healthy soils might promote have obvious long-term benefits, while short-term benefits may be less evident. Changes in agricultural practices could take decades to show up as improvement in groundwater quality. Getting traction on drivers of long-term changes is difficult. One of our interviewees recalled with frustration efforts to put nitrate contamination of groundwater on the climate agenda. Funders, she said, were not interested in investing in change with little short-term impact. "You know the reduction of loading, even if we started today, to somehow reduce by 90% the amount of nitrogen we're applying into our agricultural system. You wouldn't see a [groundwater] result immediately. It is a longer-term benefit and that's also hard."

Several of the organizations we spoke with identified a need for better data and research. There is little data on how specific agricultural practices contribute to pollution burdens, such as the effects of organic agriculture's soil management on nitrate levels in groundwater, or the impact of individual manure and nutrient management practices on particulate levels. Others flagged the gap between current research funding priorities at the University of California and Cooperative Extension and the kinds of transformational projects many would like to see.

Making sure farmworkers and immigrant communities have a voice in policy came up repeatedly. Others expressed hope that attention to soil carbon will somehow relate to efforts to support a more just economy in the Valley overall. As Janaki Jagannath expressed, "What is true sustainability for the people who we really owe our gratitude to, who build this ag economy in this first place? I am not sure that we have an answer to that yet, nor that we are going to have an answer for a long time. All we can do is equip people with some tools to have the conversation and hopefully move towards policy alternatives that help create that."

A Holistic Approach

Many of the health and environmental justice groups in the Valley have begun to take a holistic approach to these issues – to envision, from a grassroots perspective, what a sustainable agriculture might look like. The Community Alliance for Agroecology is a grassroots effort in the valley that brings together groups focused on agriculture, justice, and sustainability. The group is focused on short-lived climate pollutants and

Community Alliance for Agroecology's Janaki Jagganath explains that peanuts planted on small farms across the San Joaquin Valley (pictured: Sanger, CA) fix organic nitrogen and replace lost organic matter back to the soil without successive applications of synthetic ammonia fertilizer

environmental health, which are policies that relate to soil carbon and regenerative agriculture. The group's coordinator, Janaki Jagannath, sees an opportunity "to build a dialog basically around empowering the small scale farmers and communities in the conversation on soil carbon sequestration. We are building a vocabulary of what sustainable agriculture is from the ground up, not subscribing to somebody else's definition of it. These communities for so long have been formed and burdened by the agricultural system. To actually return to those very communities and ask 'What does a sustainable agricultural vision look like for the state of California?' and begin to push those alternatives to our agencies in Sacramento. A main one of those is the Healthy Soils Initiative because soil and soil carbon is a healer of a lot of these different issues that we are constantly up against."

CRPE is working with communities to encourage whole-systems thinking, and creating community gardens and small businesses in farmworker communities. "Farm workers are experts in growing food, but do not have access to land and water and resources to grow it for themselves. The great irony of the Valley is that we produce food, but there are food deserts in the Valley. We want to close that gap. That has been really exciting. We have been using pesticide-free, drip irrigation systems, looking at sustainable practices, and have had a couple of very successful growing seasons. That has been really exciting. We are trying to figure out how to scale that up and make these opportunities available to farmers of Color and growers of Color in the Valley that know how to grow food, that are interested in growing ethnically and culturally appropriate food, and really getting them a market and a place to actually benefit economically as well as environmentally."

Brent Newell of CRPE outlined the importance of a comprehensive view, "Is the conversation around healthy soil identifying the holistic nature, the big picture importance of it? Is it really identifying a vision for the future of farming and how that can address multiple environmental and social needs? Our view is gosh there are opportunities for major social reform, looking at co-ops and healthy schools for Latino kids and better air quality because you don't have factory farms with thousands of cows in freestall barns. The conversation is uninformed in the way communities are uninformed…We don't all understand the whole picture."

Rural Workforce Development

Restoring the carbon cycle will require more workers and a more educated workforce. This is an opportunity for youth empowerment. Prescribed burns can help forests and forest soils store more carbon.[18] Reforestation and afforestation in urban and community forests can make a significant impact.[19] Restoration efforts on wetlands and rangelands can efficiently store significant amounts of carbon in soils as well. Many existing government programs, from water management to wildland fire, agriculture, and wetland mitigation contribute to the carbon cycle. Shifting natural resource management to manage for the carbon cycle could open up opportunities for both job creation and carbon sequestration.

Much of this work is already happening, but needs to be rapidly scaled up and re-focused to deliver more community and climate benefits. Current state funding for wildland and urban interface fuels reduction and restoration covers only a tiny fraction of the projects needed. The California Conservation Corps does some of this work and offers opportunities for young people to get work experience, but their funding is limited, as is their educational programming. For comparison, during the Great Depression, the CCC employed more than 30,000 people in California and planted over 3 billion trees nationally. If a similar percent of California's population went to work in our forests

and working lands, there would be over 211,000 jobs for young people.[20]

As one interviewee told us, this is an opportunity to not just give young people a transitional job, but to develop local experts in natural resource management. The United Farm Workers' FIELD Program is a model for this kind of justice-based workforce development. High school students are trained as teachers and naturalist guides, and the FIELD Corps takes on trail restoration and park maintenance in the course of a broader educational program. "If we have public resources that ultimately are paying for this," she said, we need to have some real benefits in terms of leadership development. "It's different to tell people to plant a bunch of trees along the highway than to understand the value of how you're doing that so you can have continuous management for soil health. That's totally different. It's not that I don't think the Conservation Corps wants that, it's that we are not really intentionally doing that."

Scaling up composting will require a significant number of new jobs as well. In order to make California's 75% recycling goal by 2020, organics waste processing will require 14,700 new jobs in addition to new infrastructure.[21] Applying compost on farm and rangelands, including significant acreage within urban/suburban regions, will create new jobs as well for people skilled in soil management.

These projects can be part of a broader vision for community investment and development that includes youth empowerment, economic development, soils, and carbon. These projects point to a vision for community development oriented around regenerating natural resources, wealth, and health. As regions across California develop climate mitigation and adaptation plans, urban and rural working lands, including the millions of acres of rangelands and cultivated soils adjacent to and within more urban areas of San Diego, the Inland Valley, Los Angeles, Bakersfield/Fresno, Sacramento, and the Bay Area, constitute a significant opportunity to restore soil health and invest in environmental justice communities.

Part II: Soil and Health in Urban Landscapes

> "I don't see a disconnected relationship between our soil and what it means to live in an urban environment. It has implications for our water and implications for our ability to plant more trees and to address the urban heat island affect. It has implications for our ability to grow food here locally by us maintaining or building some sort of food sovereignty. It has implications for our children and their health, being able to play in green spaces or even having access to green spaces. It has implications for our homeowners and our ability to transform the use of that land and save water. So it has tons of implications for us here in urban areas."
>
> -D'Artagnan Scorza, Social Justice Learning Institute

What would it look like if we started managing urban landscapes holistically? Urban landscapes have their own ecology. Cities are where the vast majority of people interact with the environment, learn about natural resources, and engage in the democratic process. California cities cover 3.6 million acres[22] and are home to nearly 95% of the state's population. With so many people and so much space, urban ecology has a significant impact on the carbon cycle and on how the carbon cycle is managed and understood.

We wanted to explore the urban connections to healthy soils. Where is there overlap and space for collaboration? Where are organizations bridging the divide between urban California and the rural counties that produce food for the cities? How can healthy soils be part of broader efforts to create a healthy built environment and create regenerative urban landscapes?

Our interviewees suggested a justice-based approach to healthy soils in urban communities might yield important gains:

- Just transitions and job creation: Many urban organizations view their food systems work through the lens of a transition to a more green and just economy and a healthy urban environment, in general. All our interviewees saw a potential for job creation and local economic development through creating a more carbon-friendly food system.

- Urban agriculture and forestry: Urban farms grow healthy soil, healthy food and educated, engaged citizens with a stake in sustainable resource management. Efforts at restoring urban forests and streams help create the natural mosaic required for resilient urban communities.

- Creating more informed citizens engaged in natural resource management: With so many California residents in cities, parks, urban farms, green belts and other open space is where the majority of residents interact with nature. Maintaining these spaces is one way of building the political will and democratic engagement with natural resources necessary for a more just transition to healthy regional economies.

D'Artagnan Scorza with youth participants of the Social Justice Learning Institute

- Urban waste recycling and composting: Food and other organic wastes from cities can be an excellent source of compost for farms and ranches. Composting diverts waste, prevents methane emissions from landfills and recycles carbon. Both large scale and decentralized composting operations need support for new infrastructure to scale up.

- Brownfields and green space: Community organizations in cities are working hard to restore toxic brownfield sites, increase access to green space, and create a healthier built environment. These spaces are a significant platform for restoring soil and human health and engaging urban community organizations in both near and long-term change.

Just Transitions and Citizen Engagement

Connecting people to soils can be a means for creating the tangible experience with natural resources essential for democratic natural resource management. We can connect demonstration sites in cities to tangible political processes that will allow for effective and equitable long-term management of our soil, carbon, water, and other precious resources. We need to create a situation where our policy makers, urban citizens, and rural citizens all have the ability to come to a decision-making table educated and ready to make hard decisions. Urban ecology is key for this to happen.

As Doria Robinson of Richmond's Urban Tilth told us, it is not the size or the scale of a farm that matters, but the number of people who are directly engaged in relationship with the land. "When I think of this conversation and what is missing about land restoration and building healthy soils, it is that," she told us. "What we are really talking about is getting more people who are paying attention to living systems and putting themselves in direct relationship with them and feeling a sense of responsibility over what happens."

Soil health work can be part of a broader, more just transition to a greener economy. This transition requires a "50 or 100-year sort of outlook." It requires us to re-imagine what it means to have an impact. Beyond the number of tons of carbon sequestered today, a long-term view requires efforts that will build political power and social relationships that drive change over time. Many organizations expressed a desire for climate funding to include a diversity of work, to go beyond the "band-aid approach" and to begin to address root causes. Climate change funding, according to one of our interviewees, should focus on "transformational projects using those resources for multiple benefits." Almost every interviewee expressed this sentiment, whether they were talking about brownfield remediation or city composting infrastructure, urban agriculture or green space. We share this vision as well, and see the following three areas as a space where just transition includes healthy soils.

Urban Waste and Composting

Urban waste streams are an obvious place where our management of the carbon cycle is inefficient—efficient management presents an enormous job-creation opportunity. The State of California sends roughly 10 million tons of organic matter to the landfill every year. If composted this material builds soil organic matter, reduces growers' dependence on chemical fertilizers, and creates jobs in the process. A study by the Blue-Green Alliance, a coalition of labor and environmental groups, found that if the nation as a whole were to divert 75% of its waste from landfills, it would create over 1.5 million new jobs nationwide. They found organic waste diversion creates an average of one new job for every 2,000 tons of diverted waste. San Francisco alone composts over 600 tons of organic matter every day, and created over 500 jobs since the policy was put in place.[23] Demand for compost from the city's facility outstrips supply.

Los Angeles is also re-imagining its waste stream as a resource. The Los Angeles Food Policy Council (LAFPC) and the Don't Waste L.A. Campaign recently ushered in a new system for assigning contracts to municipal waste haulers. The previous system was unregulated with different companies competing for business all across the city; it put a lot of trucks on the road, saw many health and safety violations for workers, and had low environmental standards. The LAFPC came in to design a suite of policies for organic waste diversion including composting, livestock feed, anaerobic digestion, and food resource recovery. "We're not going to get our Zero Waste goals met if we don't tackle organic waste recycling," LAFPC Executive Director Clare Fox told us. LA County has "a real interest in state level policies and the Healthy Soils Initiative because we know we need new infrastructure, and we need investments in that infrastructure. On a state level we need to figure out how LA can get its fair share, and [make sure] those allocations are coming down in a good way."

The city needs resources and partnerships to change behavior—to encourage composting, create the necessary infrastructure, and make sure the urban food waste stream is as clean as possible. Community composting emerged as a central tenet of LAFPC's recommendations. L.A. Compost, a local organization, runs eight 'hubs' in Los Angeles for community-scale composting. The organization teaches composting at churches, community gardens, and farmers' markets, diverting food waste to build organic matter for urban agriculture. The effort is relatively new, but L.A. Compost already has a waiting list of 20 sites that would like to host a community composting facility. These small-scale sites can be an important part of urban waste solutions. "There's a place for everyone," Clare Fox told us. "We need a diverse eco-system of activity, it's great that we now have exclusive waste franchise contracts so we can pull the big haulers up to better standards, but we need LA Compost, because we want a biodiversity of operations that can address this issue."

Michael Martinez, Director of L.A. Compost, is a former teacher who sees the value of hands-on education to change habits. "It's all about equipping and empowering the people that are creating these organic scraps to begin with…It is definitely heavily education focused. Our goal is for scraps to not leave the zip codes, to not have to travel two hours to Bakersfield where the compost is processed currently, and then be driven back to LA. We are essentially creating hubs that reflect the communities in which they're located. So scraps are cut on site, compost is built on site. I think the goal is to really build community as we're building soil because you're changing culture, you're changing the mindset of the individuals involved." Community gardeners are already demanding more compost than the group can produce, he told us.

In the coming years, L.A. Compost will continue working to establish hubs and education programs in as many places as they can. Martinez's group is working on mapping the space available to scale up community composting in Los Angeles County and quantifying the potential for local waste diversion. Martinez hopes that hands-on education will help make composting second nature. "It's just part of washing the dishes or hanging the clothes on the line, something that they're doing in their backyards or across the street."

"We're building soil in communities that otherwise are just covered in concrete." Martinez told us. "So we're actually building soil that's storing water that's sequestering carbon, that's building healthy food. And all that's affecting the climate. Maybe not in the huge way like a farm would, but collectively, it is making an impact."

Brownfields and Green Space

Urban green space is a precious resource, especially in communities that lack parks and other open areas. Brownfields are an opportunity to remediate soil and improve people's health. There are some 90,000 brownfield sites in the California; 67 are active EPA brownfield clean-up sites.[24] Many of these clean-up efforts came about after long term campaigns to force soil remediation, and are part of longer-term efforts to build more regenerative, healthy urban landscapes.

Several of our interviewees began a discussion about healthy soils with an anecdote about brownfields and green space, often in the same breath. For example, Communities for a Better Environment (CBE) has been working to transform a 110-acre parcel of land in a predominately Latino neighborhood in Southeast LA, abandoned by industry, with heavily

polluted soil. The group is working to present a vision for restoration that would include access to recreation and space to grow food. "The idea was to really take on some of the community health issues that are present in Huntington Park. Community health is linked to lack of access to park space and green space and other things. Our communities do not have that kind of access." CBE works with other organizations to restore the L.A. River, with the L.A. Neighborhood Land Trust on preserving urban green space, and with the city of L.A. to get sufficient green space written into the city's sustainability plan.

The connection between health, green space, and brownfields was clear in Inglewood as well. Dr. D'Artagnan Scorza, Executive Director of the Social Justice Learning Institute, is currently working on a campaign to remove arsenic from playground soils in Inglewood. Scorza told us toxics in the soil and green space are priorities in his community, "One of the things I think our community members, at least here in the city and in South LA, are constantly concerned about is the lack of available green space. And it's also the toxicity of our soil in our land as well. So we advocate for health in the built environment. This whole soil carbon sequestration conversation for us is related to and founded in the relationship we have to our own health, both in the near term and short term. So in an urban environment, in urban spaces, if soil that kids want to play in is toxic, or [under concrete] because of infill and urban renewal and development, then we're not going to have that land available to help facilitate healthier lifestyles."

Improving health in the built environment takes resources; it takes resources to clean up contaminated sites and create opportunities for people to recapture something precious—connection to and ownership of the land. CBE just helped to close down Exide, one of the largest recycling plants in the country. Exide, for about a decade, had been allowing toxics from battery recycling to seep into the ground, and contaminated some 10,000 homes nearby with toxic levels of lead in their soils. The state just approved $172 million for cleanup, a bit less than half of what CBE estimates it would take to remediate that land.

Byron Ramos-Gudiel told us, "When I was a kid [we] had chickens and we had vegetables in the back and mom would scream at us from one room asking us to go pick peppers or go get cilantro or whatever it might be, go get eggs. We lived in South LA in a house probably the size of this where there were three families... It was a little micro-shared economy there. The point is that those opportunities just are not there as much

Los Angeles County residents in support of California's AB 551, legislation supporting urban agriculture incentive zones

anymore. To hear folks in Southeast LA talk about how they used to grow all of these things and that they cannot anymore." The land is too contaminated. "You can tell that has a psychological and emotional impact. I talked earlier about healing, right, a lot of healing needs to happen in our communities. I think a lot of these questions about our relationship with soil is a question about culture. I think that we do see the opportunity to create some of these spaces for our communities as a way to bring a piece of our culture back."

Urban Agriculture

Urban agriculture is a key place where urban communities learn about and engage with soils. Urban agriculture takes many shapes, from community gardens in parks and other public land, to backyard plots, commercial farm businesses, school gardens, and job training programs. Growing food in the city can create jobs and green space, and connect young people to healthy habits. It can make neighborhoods safer and healthier. Gardens can be a platform for broader community organizing.

Most urban farms and gardens are small; however, their cumulative impact is not. The Los Angeles Food Policy Council lists 61 different organizations that facilitate collaboration, research, and policy change to support urban agriculture in LA County.[25] The Los Angeles Community Garden Council provides services to 125 community gardens.[26] A recent study found some 1200 acres of public land in Oakland that could be available for urban food production.[27] The City of Oakland lists 55 publicly owned gardens in addition to the dozens of farms and non-profit urban agriculture ventures in the city. In Richmond, California, Urban Tilth manages 7 school and community gardens as well as a three-acre farm. As Byron Ramos-Gudiel of Communities for a Better Environment told us, "One of the big pillars of our vision is for a local economy that is driven by local production of things like food. Not just in terms of food production of course, but in terms of all of the health impacts that it comes with it, in terms of job creation and education. We want to have a little bit more say in both what we consume and how it is grown, in order to help to create a regenerative economy."

Urban Tilth trains and employs young people as "home grown experts," teaches about the connections between food, health, poverty, and justice, and works with the city to get more fresh, healthy food into the community. Urban Tilth's three-acre farm runs between two creeks: Wildcat Creek and San Pablo Creek. The group is building a new watershed center on the property and training people from North Richmond, so "they have more than a labor kind of understanding of water, of ecosystems, and then they are working to help restore these areas that are running through their neighborhoods."

This work does more than restore the urban environment. It builds community. "There is this like Urban Tilth family," Executive Director Doria Robinson told us. "It is something really real. You come in and stuff is different. You are not isolated. There is stuff going on. You can come and hang out. You end up doing work in the stream of things. We have actually flipped that narrative a little bit. So, to be sweaty and dirty at the end of the day is kind of like, cool."

City soils often need significant inputs before they can be productively farmed. Doria Robinson describes the process. "Soil in urban areas is lifeless, usually, or just really deficient in nutrients, kind of like people, not that the people are lifeless, but they are really in need of nutrients. And so, we spend a lot of time, sometimes not even starting production on a site for a year or two so that we can first heal the soil, bring life back to the soil, putting a lot more organic matter into the soil, making sure that it can hold water better so we can actually conserve water. It is essential to our teaching."

Quantifying the ecological, educational and carbon impacts of urban farming requires resources and partnerships. Doria explained to us the potential for a large scale composting operation using the school district's scraps, ideas for cooperatives of smaller scale urban farmers, urban land management collectives, and other big ideas to scale up their work if there were the time and resources to establish the right relationships. Public agencies and foundations want data from farms on public land, she told us; how much carbon they sequester on site, how much waste they divert from the landfill, and how many people are interacting with natural resources in a new way. Doria wanted partners to quantify these ecological values. "I mean, until we kind of tell that story of how that impact happens, how it is important for people to be included, I do not know; I do not know why they would care."

Urban agriculture and green spaces have spiritual and cultural value for urban communities. Byron Ramos-Gudiel of Communities for a Better Environment told us, "We need green space for creation, for spiritual healing, for all of these different things, but we also need it so that our communities can have access to grow their own food. Again, it is just the piece of our culture, black and brown culture, that we just do not have access to."

Part III: Connecting the Dots

"Connecting the dots between pollution, healthy soils and healthy communities can

help set priorities for climate work. You know, it is just; they are all separate right now. I think our collaborative really is working on taking the skills that we want to build, and using this new enlightenment around soil that seems to be taking place in the state as fuel to address environmental justice concerns."

– Janaki Jagannath

We have to connect the dots between the carbon cycle and the work to build healthy, just communities. We asked our interviewees about the gaps that still need to be overcome to connect the dots between soil, climate and justice. Two key themes emerged:

- Community organizing: Soil carbon work is a part of a broader just transition to a carbon-free economy. That transition starts with organizing frontline communities, and making sure that environmental justice has a place at the table.

- Bridging gaps: Policy makers need to see the economic and social benefits of healthy soils. Community organizations often have other priorities, feel like policy makers do not take their concerns seriously, and emphasize the importance of holistic change, of which soil carbon is a part. Gaps to participation in soil carbon work for small scale farmers, including access to land, credit and technical assistance need to be addressed holistically as well.

Each person we spoke with stressed the importance of organizing, movement building, and community empowerment. Environmental justice groups are engaged in democracy and generational scale change. Communities on the ground see that work to protect the climate and vulnerable communities cannot succeed without that. Jenny Rempel of the Community Water Center echoed the sentiments of many organizations: "I think the root of all our work is trying to build community power… The reason you even have natural resource disparities - It is because of racism and extreme inequalities in wealth and power." Undoing these disparities is a generational challenge.

Many of our interviewees had very specific recommendations for how funding for soil health work could achieve these multiple benefits. Those start with making sure that new climate investments will not cause local pollution. Several interviewees were concerned about big dairies in the San Joaquin Valley. Public money for methane digesters may deal with some of the greenhouse gas emissions from those dairies, but not the air and water quality issues that affect the people who live near them. There was broad agreement that there should be very strict guidelines about climate funds creating negative local impacts. Caroline Farrell echoed many interviewees: "Local communities that are most affected by conventional agriculture right now - the burdens have to be removed and the benefits should actually reach the people who are most impacted."

Identifying and prioritizing community priorities when spending climate policy funds in disadvantaged communities ensures that funds directly benefit those communities. Several organizations expressed unease with the way California is currently identifying what counts as a benefit to disadvantaged communities for funding under the greenhouse gas reduction fund. We heard many versions of this issue. "Funding programs that are set up at the state level as a result of greenhouse gas funds often do not come back to the communities that are most impacted. The programs…failed to even understand what the need is in the communities." Others suggested pressure to spend the climate funds in 'disadvantaged communities' led to questionable projects. There is less pressure to invest those resources into disadvantaged communities if the state is claiming all these other things are benefits. "When it is a tangential benefit, or a questionable benefit even… it still counts. In the ag context, all of the irrigation upgrades on large farms were considered a disadvantaged community benefit which, not denying that anything that is good for aquifer health is great for everybody, including disadvantaged communities…, but is that really the kind of benefit that folks want?" asked Phoebe Seaton. Climate funds, she said, should directly benefit low-income communities and be tied to community priorities rather than relying on secondary or tertiary benefits. Another interviewee was more blunt, "With ag investments from the Greenhouse Gas Reductions Fund or any ag investments from the Department of Food and Ag - how are they actually returning benefits to rural communities? Like, we are not allowed to talk about how big ag made those communities disinvested and environmentally unjust and poor in the first place?"

Oversight and accountability in climate programs is essential, as some funding in disadvantaged communities can be counterproductive if done poorly. As Caroline Farrell commented, "I think it is going to require a lot of state oversight for ensuring that those benefits actually reach those communities because, left to their own devices, it will just go back to perpetuating the system that exists now, which is very inequitable, very environmentally damaging, socially damaging, and it is not going to get us where we need to go."

The voices of affected communities, especially farmworkers, must be fully represented at the policy table. "I think that is a central point if we are really going to achieve multiple benefits from climate

policy and actually achieve our climate goals," remarked Caroline Farrell. "I think we do have to shift the political structures of the valley. I think working directly with impacted farmworker communities and communities of Color in the valley is a big piece of making that shift possible... Having a more robust democracy requires us to have voices involved. The voices of the community that have been silenced have largely been farmworkers."

Many interviewees worried that urban producers would be left out as well. Urban producers work on such a small scale, several interviewees expressed doubt that the state and other funders would see the value of urban healthy soils work. One interviewee expressed hope that a single organization with administrative capacity could aggregate the documentation often required to participate in publicly funded projects, or that the state might streamline heavily bureaucratic grant processes to make it possible for small organizations to participate. Others worried that urban groups would not connect the dots or even hear about how their work connects to, or could be supported by, soil health initiatives. As D'Artagnan Scorza noted "Often organizations of Color, organizations that are led by people of Color, organizations that are in economically vulnerable communities that are serving people who are most vulnerable, don't know about these resources…So drawing a connection and then getting the word out could be two strategies for directing those funds as well as ensuring at the state level, that the types of projects that will have a direct impact on the quality of life for folk who are most vulnerable will be included as acceptable projects."

Nearly every person we spoke to told us that soil health work needs to start by using an equity framework and identifying community priorities. Specific suggestions came up again and again, such as creating a community advisory board for soil health work and prioritizing projects that environmental justice communities have identified as priorities for climate funding. We need to use "different indicators where there are social, economic, racial inequities." One interviewee told us, "It's the same communities over and over again that are doing well, and the same that are not. So having some sort of framework like that - I hope you guys can figure it out."

Gaps and Next Steps

Policy makers need to see both the economic and social benefits of healthy soils. More research needs to be done on the specific ecological practices and their impact both on the soil and on communities.

We need to bridge the gap between soils and environmental justice. Funding sources meant to sequester carbon often do not count the co-benefits, and many soil health projects that would immediately benefit disadvantaged communities, like creating more urban green space, or mitigating groundwater and air pollution, might not be the most efficient way to sequester carbon dollar per ton. Discussion, research, and collaboration is needed to overcome this gap. "The space between the two is really vast," one respondent told us. Most of the people we spoke with are juggling other priorities, from dealing with traditional environmental justice concerns like toxics, to making sure youth they work with are cared for. Other respondents questioned whether climate policy was the place to try to bridge environmental justice and agriculture.

Incorporating soil health work in a commodity-based economy like California's is a challenge. Soil health work is unlikely to reduce the poverty and inequality in the Valley caused by low wages and concentrated land ownership. Because farms in the valley are so large, one respondent doubted the impact of community-based approaches. "Community-based projects and healthy soil, those—for California agriculture that's not possible… if we can show how a commodity-based agricultural economy for export can deal with this in a multi-faceted way, climate and poverty alleviation or whatever you want to call that other thing, we can export that model. But what we're exporting right now is specialization of production. And we are not going to slow down that force."

Land access is a serious barrier for small scale and lower-resource farmers to participate in environmental incentive programs, as are barriers in regulatory and market information. The majority of small-scale and immigrant growers rent or lease their land, often on short term leases. Investing in soil health practices and applying for government cost share programs may not be worth the effort for small scale farmers unsure if they will be able to stay on a piece of land long enough to see the benefits from investments in soil health. New models of farmland conservation where land trusts own farmland and give long term leases to small scale farmers could be part of an effective strategy to mitigate this and to protect the Valley's rapidly disappearing farmland.[28] A survey of Hmong Farmers in Fresno County found that farmers often did not know about programs designed to support their businesses, and did not qualify for credit opportunities because of a lack of long term leases and record-keeping.[29] Designing soil carbon incentive programs to be accessible to small scale and immigrant farmers is important as well.

Research is also needed to identify the places within existing natural resource policy where funding could be re-directed to better manage for soil carbon. The state manages programs and funds for watershed restoration, state parks, wildfire

management, farmland conservation, forestry, water efficiency, and many other areas that impact the terrestrial carbon cycle. Changes in these programs, for instance prioritizing restoring riparian areas in places with serious groundwater contamination, or growing the budget for wildfire prevention, could help create jobs, sequester carbon, and improve environmental health – but it will take sustained policy research and collaboration to identify priorities.

Urban producers were worried that their concerns would not be taken seriously. One urban farmer described having trouble accessing UC Extension services; others felt policy makers did not often see the environmental concerns and initiatives led by urban communities of color as legitimate. Doria Robinson of Urban Tilth kept coming back to a need to build bridges, to a need for "uncommon relationships, uncommon crisscrossing of communities…I think one of the biggest things that I have kind of come to realize is you really cannot underscore enough the importance of breaking down barriers to communication between sectors… We need to actually bridge the gaps between the industrial system, that is what we are learning, and what we are trying to re-envision in urban sectors and bridge the gap, meaning, actually create personal relationships with people from both sides, because I feel like that is the only way that we are really going to be able to re-envision the whole system."

Conclusion

Linking carbon capture and healthy soils to the economic and environmental justice concerns of low-income and underserved communities is not a straightforward exercise. It will require nuance and sophistication from practitioners, activists, government decision-makers, and private foundations. California's SB 535, the state law requiring funding for environmental justice projects under the state's Greenhouse Gas Reduction Fund (GGRF), is a mandate to find precisely this kind of link. We uncovered an awareness, a desire, and a number of ideas of how these communities can connect their efforts for food, health, and environmental justice with soil-building and carbon capture. The question then is, "Which opportunities can best integrate the widest range of activities for the most effective, inclusive and equitable impact over the longest period of time?" The Healthy Soils Initiative and other similar state and local programs focused on agriculture and restoration of working and natural lands in rural and urban landscapes are unique opportunities to engage stakeholders and advance research and projects that address justice and restore soil health and carbon.

Answering this question will require further dialogue and research as well as some trials and pilot projects to test some of the promising ideas identified in this study. A participatory and iterative process that brings key actors together across sectors may yield the most promising results in the shortest amount of time. This will be important for creating enthusiasm and clarity about a restorative healthy soils initiative that captures carbon and rebuilds communities. It will also help establish the organizational framework for these efforts, ensuring their institutional sustainability moving forward. Within this framework, we could consider:

Community organizations and environmental Justice Advocates:

- Convening impacted communities and environmental justice groups to set priorities, goals and objectives
- Convening with government officials to explore policy priorities and potential synergies with existing programs

Government and private funders:

- Growing youth empowerment through fire prevention and land restoration programs
- Designing funding programs tailored for Environmental Justice and healthy soils, and considering which funds already achieve these goals that could be re-purposed
- Streamlining funds for urban greening and green agriculture
- Funding research on specific contributions of agricultural practices to reducing environmental health related pollution and creating measurable local health and environmental benefits
- Identifying the areas with highest groundwater pollution and other pollutants for soil carbon work

Collective efforts:

- Further research and analysis into the specific strategies we identified to integrate soil carbon sequestration and environmental justice, with an eye for how to quantify impact
- Ensuring all are educated on the carbon cycle and its impact on water, soil, and air quality, and farming, ranching and urban communities

This report points to a vision to integrate healthy soils into a new model for community investment and development – a model that connects rural and

urban development, includes youth empowerment and green jobs and environmental health, and regenerates natural resources. It is a vision that includes a plurality of viewpoints on natural resources and sees urban areas as important ecologies as well.

The importance of taking a broad-based approach and working with key partners in a participatory way cannot be overemphasized. This approach not only integrates a wide assortment of skills, experience and place-based knowledge, it builds the capacity for informed and committed engagement for the construction of a sustainable future.

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