Critical thinking from Stanley Foundation conferences

POLICY *dialogue* BRIEF

Land Use Dialogues

Setting International Policy Objectives for Agriculture Transitions in Pursuit of the 1.5° C Goal

Making a Global Transition for Agriculture and Climate Change

The impacts of temperature increase over 1.5° C would be detrimental to agriculture and food systems around the world, reducing yields dramatically, accompanied by increased pests, worsened livestock and fish health, and a large loss of jobs. The particular vulnerability of food security from climate change requires increased action from other sectors; however, the 1.5° C goal cannot be achieved without climate action in agriculture and food systems.

As countries take steps to limit global warming to 1.5° C, as enshrined in the Paris Agreement, they must prepare for agricultural transitions to play a key role in cutting greenhouse gas emissions and possibly negative emissions by midcentury. In carrying out agricultural transitions, policies should align with the Sustainable Development Goals and safeguard food and nutrition security and the rights of small-holder farmers, women, and indigenous people. Solutions must go beyond reductions in point-of-production emissions to include changes in supply chains and consumption patterns.

This policy dialogue brief begins by explaining what is needed from the agriculture sector to stay on the 1.5° C pathway while ensuring food security and land rights. The second section sets out a comprehensive set of solutions for the agriculture sector, including—in addition to production-focused approaches—land management and restoration, soil carbon sequestration, and food systems. The third section will makes recommendations for international policy as the world moves to implement the Paris Agreement. The fourth and final section discusses topics such as bioenergy carbon capture and storage (BECCS), offsets, and low-carbon development for agriculture which need more examination and discussion to further devise global agriculture and climate change policy.

Hosted by the Stanley Foundation and Woods Hole Research Center, in collaboration with

EDF ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

CENTER FOR CARBON REMOVAL

October 5-6, 2017
Woods Hole Research Center, Falmouth, MA

This brief summarizes the primary findings of the conference as interpreted by the roundtable organizers. Participants neither reviewed nor approved this brief. Therefore, it should not be assumed that every participant subscribes to all of its recommendations, observations, and conclusions.

What Is Needed From Agriculture to Stay Below 1.5° C

The scenarios for staying below the 1.5° C target that include agriculture require a combination of different approaches and are far from certain. In analyzing what it would take to stay under 2.0° C, agriculture would need to mitigate approximately one gigatonne of carbon dioxide equivalent (GtCO2e) per year globally.[1] Achieving this reduction on the supply side would require, in terms of a carbon price, about $50 per tonne of incentives and disincentives.[2] While production or supply-side measures typically dominate the conversation in agriculture and climate, it is also possible to gain a nearly one GtCO2e emissions reduction from dietary changes alone, primarily from developed countries.[3] Beyond reducing emissions, the agriculture sector can contribute to removing emissions from the atmosphere as well. According to recent research, soil carbon sequestration could recover up to 320 GtCO2e in soil globally, though the time frame for achieving this is less clear.[4] This brief offers a global agriculture and climate change policy agenda that adopts a comprehensive set of agriculture solutions for climate change, including those with the highest mitigation potential—such as dietary changes, reducing food loss and waste, and soil carbon sequestration—that have thus far not been addressed.

In making these global agriculture transitions to pursue the 1.5° C target, policies must be tailored to different circumstances, contribute to sustainable development, and avoid negative outcomes. For instance, the same level of carbon tax needed to get agriculture on the right pathway in the United States may put a farmer in sub-Saharan Africa out of the market. Countries dependent on food imports are also highly vulnerable to price increases. The economic impact of hunger in places like sub-Saharan Africa is as much as 10 percent of gross domestic product. Policymakers must also consider that 80 percent of food production in sub-Saharan Africa and Asia is done by small-holder farmers with only a few hectares of land. Most of these farmers struggle to meet basic needs and battle issues of land access, competition for resources, access to weather information, and availability of credit. These issues are exacerbated for women, who make up a major portion of agriculture labor globally. In addition to producing the food, most are responsible for food preparation, gathering water and wood, and caring for children. Social norms often dictate that they eat last, compromising their nutrition and health, and that they have less access to credit, land rights, extension services, and education. Global agriculture policy will need to address these issues for developing countries, small-holder farmers, and women.

It is important to ensure that stakeholders who have fewer resources or less power can provide input into policy decisions. In many places, rural farmers and women lack a political voice, which is detrimental when it comes to the creation of agriculture policies. Not only can this lead to the exacerbation of existing inequalities, but it can result in bad policies and new issues. Many farmers, for instance, may lack the resources to commit to practices requiring upfront costs for gains years down the road. They may also lack the labor resources needed to put certain practices in place, even those that can increase soil health. Policy measures must consider the specific circumstances of implementation by small-holder farmers and women. In order for agriculture policies to be sustainable, they must be participatory, transparent, and accountable.

The next several years are crucial to ensuring that agriculture transitions are supported by global governance systems, as international, national, and subnational policy processes move to implement the Paris Agreement. The agriculture-related climate policy agenda is large and complex, going beyond the realm of conventional and rather technical production issues, such as emissions from rice paddies or cassava. As important as these types of technical agriculture issues may be, global agriculture and climate change policy must be holistic and comprehensive to include issues such as meat consumption and food loss and waste. Policies on agriculture are far reaching; for instance, changes to methods of production do not simply affect production systems but nutritional health, the cultural heritage of communities, the local environment and biodiversity, as well as the climate. For the sake of the climate and sustainable development, global policy must put the world on a bold and comprehensive agriculture transition.

A Holistic Approach

In order to create effective change in policy and governance, food systems must be thought of in a holistic manner, incorporating elements of production, supply chains, and consumption. These elements of the food system interact with and affect one another. Approaches that look at agriculture as land management, focusing on maintaining and supporting local ecosystems and preserving land for the future, can improve outcomes in terms of nutrition, emissions reductions, carbon sequestration, and the livelihoods of small-holder farmers. While land management approaches may vary, and no narrow definition encompasses them all, there is wide agreement on the kinds of principles and practices that fall under this perspective. Below is an examination of approaches to agriculture using the categories of production, supply

chains, and consumption, as well as soil carbon sequestration, land management, non-CO2 emissions, and nutrition.

Production

The focus of mitigation in agriculture has long been production systems, primarily how to increase efficiencies of yields per inputs. This approach often involves packages of technologies and techniques brought to farmers. The technologies are often highly specialized, hybrid seeds that are paired with irrigation systems and fertilizer blends that increase yields. These new seed packages are studied with farming techniques, focusing on the differences in mitigation between systems like wet and dry harvesting of rice. This approach has not been without merit, but it is often detrimental when broader impacts are not considered. Looking at production from a holistic perspective allows for the identification of benefits not only for farmers but also climate change and environmental protection. Solutions that merit further consideration include:

- **Agroecological farming** offers mitigation potential by integrating agriculture systems within ecological environments. Common techniques, such as mixing crops with trees, can improve soil quality and host beneficial wildlife, such as birds, which control insects. This reduces the need for fertilizers and pesticides while promoting natural ecosystems that provide a variety of ecological benefits, such as keeping water clean. These systems, which improve soil quality, also tend to be well adapted to sequestering carbon in soil. Agroecology also relies on the knowledge and practices farmers and indigenous people have developed over many centuries and distances them from reliance on multinational corporations for seed technologies and pesticides. But while these systems can help small-holder farmers by reducing reliance on large agribusiness, one element that can be overlooked is the cost of labor typically involved. Many agroecology techniques can be difficult to implement where labor resources are in short supply. Small-holder farmers dependent only on family labor may have difficulty adding time for the regular pruning and maintenance of trees, for instance, in addition to the existing farm and household work.
- **Precision farming techniques**, which make use of geospatial mapping, can make optimal use of resources and reduce inputs like fertilizer. Other technological systems like laser leveling of soil can reduce the demand for water from irrigation systems. Precision farming and laser leveling may be difficult to implement where technology resources are limited.
- **Cover crops, multicrop planting, and no-till farming** reduce the amount of carbon and other matter that escape soil. Additionally, these methods can reduce the amount of fertilizers needed. Overuse of fertilizers is one of the larger production issues in many parts of the world, particularly in developed countries. This is often the result of perverse subsidies that provide fertilizers to farmers inexpensively or at no cost and encourage overapplication. Tracking of subsidies, particularly for fertilizers, at a global level could provide benefits to researchers and policymakers, who could better understand where policy change is needed.
- In addition to subsidies for fertilizers, policymakers should address other **subsidies that encourage overproduction** of cash crops, such as corn and

The promising potential of soil carbon sequestration—using natural ecosystems and agriculture practices to capture carbon from the atmosphere and store it in soil—offers policymakers new opportunities for climate mitigation in agriculture and helps to reframe farming approaches.

soy in the United States. Often, these crops are used for biofuels, livestock feed, or other nonfood products. Overincentivizing them also encourages farmers to take risks planting crops where they normally would not, further depleting soil, jeopardizing water quality, and risking crop loss for lower yields given the amount of inputs required.

Climate solutions in agriculture production also include soil carbon sequestration, land management and restoration, and addressing non-CO2 emissions.

Soil Carbon Sequestration

The promising potential of soil carbon sequestration—using natural ecosystems and agriculture practices to capture carbon from the atmosphere and store it in soil—offers policymakers new opportunities for climate mitigation in agriculture and helps to reframe farming approaches. This process is actually a natural restoration of carbon that has been lost from the soil because of activities such as intensive farming. Research suggests there is untapped potential for soil carbon sequestration to address negative emissions—necessary for limiting global warming to 1.5° C—taking in up to 320 GtCO2e globally through means with a variety of environmental and climate cobenefits.[5]

Incorporating land management in agriculture policy can protect the land for future generations of farmers and rural communities.

There are limits to the amount of carbon that can be sequestered in soil, though, and once a certain level of saturation is achieved, no more carbon can be added. Further, the carbon stored in soil can be lost with the resumption of unsustainable agriculture practices. Research suggests that storing carbon deeper in soil could increase the sequestration potential and may provide more resilience from loss, but there would still be limits and the potential for massive carbon loss if best practices are not maintained.

While the promise of pulling carbon from the atmosphere into soil is attractive to the climate community, many farmers and agriculture researchers are drawn to the cobenefits that come from methods used to increase carbon in soil. These benefits include improved soil health, water quality, and retention, which can lead to better nutrition and health outcomes, as well the ability to maintain cultural traditions with diverse food crops and more traditional farming techniques. In many situations, rather than simply being a method for sequestering carbon, this is about ensuring healthy soils for farmers and communities. In the United States, a number of states have begun projects that incentivize soil management practices, like the California Healthy Soils Initiative. Though the health of soils cannot be precisely measured, and there is not an exact correlation to carbon sequestration, the techniques known to promote healthy soils, such as planting cover crops and using no-till practices, are some of the same techniques that help to sequester carbon.

Policies for soil carbon sequestration can include overt subsidies or subsidies for healthy soils and associated practices that bring additional benefits—such as improved soil organic matter, water retention, and even biodiversity—for farmers. Subsidies for soil carbon sequestration and land management could come from the reallocation of subsidies that encourage negative climate outcomes. Policies must take into account local contexts, such as the amount of carbon that can be sequestered in a given region, or the amount of carbon local ecosystems can sequester alone, compared with agriculture. Any policy built to incentivize carbon sequestration must ensure the continued management of land after carbon can no longer be added.

Land Management and Restoration

Agriculture systems should be thought of as working in tandem with the land management of grasslands, forests, and wetlands; and land restoration can work alongside or replace agriculture where intensive farming has depleted soil nutrition and ecosystems. Solutions from land management and restoration include:

- **Incorporating land management in agriculture policy** can protect the land for future generations of farmers and rural communities. Land management approaches focus on balancing the use of land for agriculture with maintaining and supporting local ecosystems and preserving the quality of land for future generations. This approach differs from policies that intensify agricultural practices in order to maximize yields for cash crops, like corn and soy, while degrading soils or destroying important ecosystems. Often, current incentive structures encourage the overapplication of fertilizer and farming on unsuitable land, leading directly to land degradation, loss of carbon in soil, water contamination, loss of biodiversity, increased pest concentrations, and limited nutritional options. This has led to negative outcomes for ecosystems, communities, consumers, farmers, and, importantly, the climate. Changing agriculture policy to account for these externalities improves soil health, ecosystems, and water retention, which can lead to more productive farming, better nutritional outcomes, and healthy communities able to contribute to labor resources.
- Where overproduction has damaged ecosystems, **land restoration** projects in areas like China's Loess Plateau and southern Spain's Altiplano have helped them rebound.[6] Efforts to map the global carbon sequestration potential of degraded land are needed to provide a better picture of where restoration will have the largest impacts. More research of the political governance of successful land restoration projects and land management is also needed in order to replicate success in other regions and landscapes.
- In other cases, land restoration can be carried out alongside raising livestock or farming within an ecosystem. **Silvopastoral ranching** systems, for instance, offer the opportunity to ranch in more sustainable ways within ecosystems, combining domesticated animal grazing in forested areas. These systems require more research; however, they offer promise as long as a balance is maintained. Too many animals in a particular area may result in overgrazing and negatively affect the ecosystem's ability to retain carbon and soil organic matter. Wetlands can also be restored with the ability to support significant fish production.
- **Management of water systems** is also important, as natural ecosystems provide hydrological services that sustain healthy farming and ranching. Farmers should be incentivized to create riparian zones as buffers to reduce water contamination. These zones not only promote sustainable ranching and agriculture, but also protect sources of water for ecosystems and consumption by urban and rural populations.

Non-CO2 Emissions

Reducing carbon emissions in the agriculture sector is vital, but a variety of other greenhouse gas emissions must also be curbed, such as methane, nitrogen, and nitrous oxide. While gasses like methane may have a shorter half-life in the atmosphere than CO2, they cause greater warming in the short term, which threatens the productivity of agriculture, among other negative impacts associated with going over the 1.5° C threshold. Non-CO2 emissions and potential solutions include:

- **Methane:** Livestock production is responsible for a large amount of methane emissions. Reducing meat and dairy consumption can help lower livestock emissions. Beyond that, for the livestock that remains, selective breeding, methane inhibitors, and genetics can reduce the amount of methane produced. However, though areas like New Zealand have developed lower-emitting sheep and are working on methane inhibitors, by and large these methods are unproven and may come with side effects, such as traces of inhibitors in milk or meat.
- **Nitrogen:** Overuse of fertilizer is responsible for large amounts of nitrogen pollution. Multicrop systems that integrate legumes, for instance, can reduce the need for fertilizer by adding nitrogen to the soil naturally.
- **Nitrous oxide:** Heavy synthetic fertilizer use and overuse of manure as fertilizer can lead to the release of nitrous oxide into the atmosphere. Farming techniques that manage and reduce the amount of fertilizer and concentrated livestock manure can help curb nitrous oxide emissions.

A number of solutions can reduce emissions from non-CO2 gasses, including curbing the subsidies and farming practices that lead to overapplication of fertilizers, changes in diets that reduce meat and dairy consumption, and continued research into low methane-emitting livestock.

Supply Chains

The way agriculture products are sourced and moved—locally, regionally, or globally—can have a major impact on greenhouse gas emissions. Creating best practices for selecting producers with lower carbon footprints, who

manage land and local ecosystems well, can help build standards for large suppliers. Another major source of emissions in supply chains is transportation, and creating efficiencies in moving products and using low emissions transport can lower the carbon footprint of food, from supermarkets to restaurants. Influencing large corporations to adopt sustainable supply-chain practices can have a major impact. The companies that make up networks like We Mean Business and the B Team can have a major impact by spreading best practices and norms on sustainable procurement of agriculture products. Between 75 and 90 percent of all grain traded internationally is done so by one of only four companies.[7] While most grain never crosses national borders, these large corporations nevertheless have a huge influence, one that likely reaches beyond the grain that is ultimately traded internationally.[8] Targeting certain agriculture products where international trade is higher, such as soy or palm oil, offers particular opportunities to develop standards that lower emissions.

Arguing for more-sustainable diets on the basis of nutrition provides a powerful way to address issues that the climate community alone could not affect. However, the climate community must also ensure that its approach to agriculture does not negatively affect nutrition.

Addressing emissions from supply chains can also benefit consumers and producers by creating efficiencies and eliminating waste, but care must be taken to ensure that supply-chain changes do not have negative externalities for communities, particularly vulnerable communities, indigenous people, or women farmers. Improving roads, for instance, may lead to efficiencies in getting food to market and decrease production emissions, but it might increase deforestation or the uncontrolled spread of intensified agriculture systems if safeguards are not in place. Supply-chain changes also should not create rebound effects. For instance, shipping food by refrigerated units can reduce food loss in transport, but the gains from this may be for naught if the result is increased consumption of foods trucked by refrigerated units, which have a higher carbon footprint. The management of how food gets to urban spaces is an important consideration and also affects land management. It may be that food production nearer to urban spaces lowers supply-chain emissions, but important considerations around the pressures on land in periurban spaces, and the other ecosystem services important to those spaces, such as drinking water, are impacted.

Consumption

The need for behavioral change and demand-side solutions in food systems has come into sharper relief as the urgency of the 1.5° C goal and the Paris Agreement now require policymakers and civil society to consider creative options beyond technological change. Recently it has become apparent that changes in diets and reducing food loss and waste have great potential for climate mitigation.

The consumption of meat in particular has drawn much of the attention in this area, but conversations are nascent, and little has translated into wider social practice. Diets in much of North America and Europe remain unsustainable, and diets in many emerging economies threaten to add to the growth of agricultural emissions from sources like beef. Meat production requires far more inputs than plant-based alternatives and has a significantly higher carbon footprint. For instance, if the cropland, rangeland, and inputs that go into producing beef for US consumption were converted to producing plant-based food for human consumption, yields could be increased to provide enough food to feed an additional 190 million people with the same amount of inputs.[9] Not all of the pressures on diet have come from climate advocates, though, as the fields of health and nutrition recommend reducing high-meat consumption, as well as the consumption of high amounts of sugar. Analysis shows that not only are high-meat and sugar consumption detrimental to health—causing issues such

as heart disease and diabetes, which can lead to shortened lifespans—but they are also extremely costly economically.[10] Health considerations and the climate impacts of beef production have reduced consumption in places like the United States, though the changes fall far short of what is needed to provide significant climate mitigation or improved health outcomes at scale. While undertaking diet changes is an urgent challenge, many people, particularly in developing countries, already have healthy diets that are within the 1.5° C carbon budget. Using the Mediterranean diet as a sustainable benchmark, lifestyles need not change to something completely unfamiliar.[11]

Social patterns, including consumption habits, can be altered, and more research is needed into how these systems change. Too often, social sciences are dismissed and receive relatively little attention compared with the amount of energy and money that go into modeling in the hard sciences. Both are needed, as the social modeling is essential to telling us how to spark the changes the hard sciences indicate are needed. What is clear from past attempts at social change is that simply telling people to change their behavior is not sufficient. Though behavior may be thought of in terms of free will and choice, people exist in larger systems and require social transitions in order to accomplish more-significant and lasting behavior change. While trends such as reduced meat consumption have impacted behavior to a certain degree, they are slower moving than the changes needed to offer significant positive climate impacts. Policymakers and civil society must identify the most effective levers for creating the conditions and support for larger behavioral changes.

In the immediate term, cultural figures such as chefs can highlight healthier, more-sustainable diets while also demonstrating how these foods can be prepared in a way that satisfies tastes. Policymakers can have impact through public sector procurement, offering sustainable foods in school and government cafeterias, for instance, combined with providing education on healthy choices. Labeling may also create awareness, for example, indicating the carbon footprint on food labels or disclosing the carbon footprint of food producers. In certain areas, public awareness and availability of local food options are also important to reduce emissions related to the transport and storage of food, though care is needed to understand what local options are really more sustainable. But awareness campaigns and labeling only go so far. Other options, such as limits on advertising unhealthy and unsustainable foods, and taxes on them, may be needed.

The impact of agricultural consumption on the climate is not limited to diet, necessarily. Consumer choices in places like supermarkets and restaurants often lead to an abundance of food that is never consumed. Here, corporations can help reduce or alter the demand for agriculture products through changes in things like marketing messages, portion sizing and packaging, menu design, and store layouts. The use of expiration dates, often not corresponding to whether a food is still safe to eat, also contributes to waste. Composting programs can be important to eliminating some of the emissions from food waste, but the primary goal should be limiting the amount of food that ends up in composting or garbage by making better choices.

Nutrition

As indicated above, nutrition considerations can cause consumption changes that benefit the climate, reducing emissions from carbon-intensive food sources that people in developed countries consume in excess. Arguing for more-sustainable diets on the basis of nutrition provides a powerful way to address issues that the climate community alone could not affect. However, the climate community must also ensure that its approach to agriculture does not negatively affect nutrition. In developing countries, where food production and climate change are serious issues, solutions must consider the nutrition, including micronutrient, needs of populations. The intensification of agriculture systems can sometimes increase production in ways that provide climate mitigation potential; however, these systems often push out crop diversity in favor of one or a few cash crops, negatively affecting the nutritional intake of local communities.

Even in instances where overall caloric intake is maintained or increased, undernourishment in terms of nutrient intake is an important health consideration. Just as overconsumption of meat or sugar in developed countries can take their tolls economically, undernourishment and hunger can cause economic loss elsewhere.

Transitioning Agriculture Through International Policy

Policymakers and civil society have a number of opportunities to begin work on climate action in the agriculture sector that they should take advantage of. Since the Subsidiary Body on Scientific and Technological Advice (SBSTA) reached a decision on the groundwork for agriculture at the 23rd Conference of the Parties (COP23) to the United Nations Framework Convention on Climate Change (UNFCCC), there is now space to begin implementing climate action on agriculture within the UNFCCC. This opportunity can open up some funding avenues, but work is needed by policymakers and stakeholders to develop more platforms for funding to feed into. Work should begin on areas where there is wide agreement around

climate benefits and benefits to local communities and farmers, such as certain agroecology solutions and best practices on land management that improve soil health and carbon sequestration. As opportunities are examined, policymakers must keep in mind the existing alignment on principles and solutions among stakeholders. These include agreement on the importance of food security, human rights—including the rights of indigenous peoples—land rights, gender equality and the empowerment of women, halting deforestation, accurate accounting on the burning of biomass, and reduction of short-lived, non-CO2 pollutants. As policies begin to emerge on climate action in agriculture, these principles must be held as central to any action.

As countries build agriculture plans into their nationally determined contributions (NDCs), ministries of agriculture must be part of the process, both for the UNFCCC to understand country needs and for decision makers who can best affect country-level change and ensure effective implementation to have input. Agriculture experts have long lamented the lack of interaction between ministries of agriculture and climate. Conversations must also include ministers of finance, health, and trade. When consumers, doctors, or organizations like the American Medical Association look for cues on nutrition, they are not often tuned into the climate community, and thus connections with ministries of health will be important to funding programs and promoting information on sustainable, healthy choices with climate benefits. In order to take a holistic approach to reducing agriculture emissions, a whole-of-government approach is needed.

In the UNFCCC, following the SBSTA decision, policymakers should begin planning for implementation in areas the decision highlights, including "improved soil carbon, soil health and soil fertility under grassland and cropland as well as integrated systems, including water management; improved nutrient use and manure management towards sustainable and resilient agricultural systems; improved livestock management systems," and "socioeconomic and food security dimensions of climate change in the agricultural sector."[12] A more robust approach to finance is also needed for work in the Subsidiary Body for Implementation (SBI), as investment opportunities are currently sparse in agriculture and spread out across a number of institutions. Importantly, policymakers must consider agriculture's contribution when looking at enhancing ambition through the Talanoa Dialogue in 2018. The Talanoa Dialogue process, which focuses on strengthening and enhancing ambition, is an important place for countries with major agriculture sectors to engage. With agriculture moving toward the implementation space in the UNFCCC, solidifying agriculture commitments in nationally determined contributions will help countries develop national-level implementation plans on which they can build a case for funding through Article 9 of the Paris Agreement.

Outside the UNFCCC are a number of venues or platforms for moving policy forward on non-CO2 emissions, including the Climate and Clean Air Coalition. Beyond those, there are other venues for discussing agriculture and climate.

The Sustainable Development Goals are an important framework for discussing climate and agriculture and are thus a natural place for some of the conversation to take place. Goals such as ending poverty (Goal 1) and hunger (Goal 2), achieving gender equality (Goal 5), promoting sustainable consumption and production (Goal 11), and using land sustainably (Goal 15) offer direct ways to engage policymakers on food and climate. In 2018, the UN High-level Political Forum on Sustainable Development will focus on "transformation towards sustainable and resilient societies,"[13] which is a good platform for discussing sustainable agriculture and food security. In 2019, the focus of the High-Level Panel will be "empowering people and ensuring inclusiveness and equality,"[14] which also provides a platform to discuss access to land, nutritious food, and the rights of women and indigenous people.

The UN Food and Agriculture Organization (FAO) has long been an important venue for agriculture and climate change policy development and will continue to be so. The FAO has added a program on soil carbon sequestration, the Global Soil Partnership, which should offer promising resources on implementation. CGIAR (formerly the Consultative Group for International Agricultural Research) and its research program on Climate Change, Agriculture and Food Security (CCAFS) also offers important resources, particularly for regionally focused research and knowledge sharing.

The World Health Organization (WHO) is a platform where the climate community should engage to discuss sustainable agriculture choices that promote positive health outcomes. The FAO and WHO also run Codex Alimentarius, a platform for collecting international food standards and protecting health through international trade.

Subnational and nonstate actors can begin to take action on agriculture as national and international policy comes together. Some initiatives have already begun on soil carbon sequestration in states like California and Hawaii.[15] Frameworks such as the Food and Land Use Coalition and climate-smart agriculture offer guidance and resources on implementing climate action with appropriate safeguards and can be advanced and built upon when taking action on agriculture. Corporations can begin work on supply-chain sustainability, and, along with other subnationals like cities, states, and regions, can jump-start efforts on agriculture, advancing a holistic approach. However, policymakers must

recognize the areas where subnational actors are limited—for instance, in the power dynamic with multinationals that control most seed and fertilizer production—and complement their action with national-level policies and finance.

Finance

Having reached a decision on agriculture within SBSTA at COP23, there is an opportunity to move conversations forward on implementation, though finance will be key to getting projects off the ground. In forestry, which moved from SBSTA to SBI more quickly than agriculture, the effort to reduce emissions from deforestation and forest degradation in developing countries, known as REDD+, helped launch a platform to approach funding for projects. Many believe that REDD+, or at least the process of putting REDD+ together, could serve as a model for how to move on agriculture. While a platform for agriculture may be needed to launch implementation at scale, other processes, like carbon offsetting in the land sector through the International Civil Aviation Organization, and sources of funding, like the Green Climate Fund, may be worth exploring.

The Task Force on Climate-related Finance Disclosure is also a good place for the agriculture community to engage finance. The task force already produces supplements on agriculture. The climate community should work closely with the private sector on climate disclosure, offering assistance where needed to ensure that businesses are encouraged to be transparent.

There are also opportunities for civil society and policymakers to explore subsidy reform through the World Bank. Subsidy reform, particularly around fertilizers and incentives for bioenergy, offer an opportunity to curb damaging practices while also moving funding to useful mitigation activities. Tracking subsidies on a global level is important, and the World Bank is well positioned to do this.

What's Next in the Global Agriculture Transition?

While international policy on agriculture and climate change has received new interest and movement, the global governance efforts to affect the required agriculture transition are far from what is needed. Maintaining consensus on the procedural principles to ensure food security and land rights will be critical to further international policy development, which should encompass a holistic set of transitions, including shifting agricultural production to adopt practices such as agroecology and soil carbon sequestration, expanding sustainable supply chains, and reducing meat consumption and food loss and waste. These transitions can be supported in the UNFCCC and other venues such as WHO, Sustainable Development Goals, and CCAC. Finance mechanisms will need to be developed as well. The global agenda for agriculture and climate change will also need to further develop what it means to have low-carbon development in agriculture and reexamine assumptions on the role of offsets, BECCS, and negative emissions.

More solutions need to be formulated for low-carbon development in agriculture that include a better understanding of the role of developing countries, small-holder farmers, indigenous people, and women in this global transition. At the top of the agenda for the 1.5° C goal is the protection of those most vulnerable to climate change. It is essential to bring this view to climate action in agriculture, ensuring that all action is in line with sustainable development, protection of rights, and access to nutritious food and water. Beyond ensuring the maintenance of human rights, climate action in agriculture has the potential to improve the

More solutions need to be formulated for low-carbon development in agriculture, which include a better understanding of the role of developing countries, small-holder farmers, indigenous people, and women in this global transition.

livelihoods of some of the poorest people and achieve many of the Sustainable Development Goals.

Moving forward, the climate and land use policy community should continue discussions around the role of offsets, BECCS, and negative emissions generally in pursuing 1.5° C. While carbon-offset mechanisms continue to be formulated, the 1.5° C carbon budget may not be able to accommodate them, even if offsets can finance land use-based carbon sinks. Offsets may also permit high-emitting actors to greenwash or take pressure off their primary responsibility to decarbonize. Techniques like BECCS are seen as completely unproven, requiring an irreversible and high-cost commitment to land for bioenergy that may actually exacerbate emissions. In some models that incorporate BECCS as a negative emission technology, land mass the size of India will be converted to bioenergy crops—displacing food production and threatening land rights. Further development of policies around offsets and negative emissions will need to address these concerns.

Climate mitigation solutions outside of agriculture production also require considerable examination. It is clear that substantial mitigation is possible from areas like consumption or supply chains; however, major gaps in knowledge on developing or implementing policies in these areas still exist. These must be addressed in order to tackle climate action in these areas and truly begin more-holistic approaches to agriculture transitions.

Endnotes

1 Eva Wollenberg et al., "Reducing Emissions From Agriculture to Meet the 2 °C Target," *Global Change Biology,* Vol. 22, No. 12, December 1, 2016, pp. 3859–64.

2 Pete Smith et al., "Agriculture, Forestry and Other Land Use (AFOLU)," in *Climate Change 2014: Mitigation of Climate Change,* Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, ed. O. Edenhofer, R. Pichs-Madruga, Y. Sokona et al., pp. 811–922.

3 Marco Springmann et al., "Analysis and Valuation of the Health and Climate Change Cobenefits of Dietary Change," *Proceedings of the National Academy of Sciences,* Vol. 113, No. 15, April 12, 2016, pp. 4146–51.

4 Jonathan Sanderman, Tomislav Hengl, and Gregory J. Fiske, "Soil Carbon Debt of 12,000 Years of Human Land Use," *Proceedings of the National Academy of Sciences,* Vol. 114, No. 36, September 5, 2017, pp. 9575–80.

5 Ibid.

6 See the work of Commonland in Spain, accessed February 15, 2018, *http://www.commonland.com/en/projects/187/altiplano-estepario*; and "Restoring China's Loess Plateau," The World Bank, March 15, 2007.

7 "The Global Food Crisis: ABCD of Food—How the Multinationals Dominate Trade," *The Guardian*, June 2, 2011, accessed February 15, 2018, *https://www.theguardian.com/global-development/poverty-matters/2011/jun/02/abcd-food-giants-dominate-trade*.

8 "Cereal Secrets: The World's Largest Grain Traders and Global Agriculture," *Oxfam*, April 2012, accessed February 15, 2018, *https://www.oxfam.org/sites/www.oxfam.org/files/rr-cereal-secrets-grain-traders-agriculture-30082012-en.pdf*.

9 A. Shepon et al., "Energy and Protein Feed-to-Food Conversion Efficiencies in the US and Potential Food Security Gains From Dietary Changes," *Environmental Research Letters,* Vol. 11, No. 10, 2016.

10 Springmann et al., "Analysis and Valuation."

11 Lluis Serra-Majem, "Outcomes From the 2016 First World Conference on the Mediterranean Diet: Revitalizing the Mediterranean Diet," in *Development of Voluntary Guidelines for the Sustainability of the Mediterranean Diet in the Mediterranean Region*, Food and Agriculture Organization of the United Nations, March 2017, accessed February 1, 2018, *http://www.fao.org/3/a-i7557e.pdf*.

12 UNFCCC, Subsidiary Body for Scientific and Technological Advice, 47th session, agenda item 7, "Issues Relating to Agriculture," November 14, 2017, accessed February 15, 2018, *http://unfccc.int/resource/docs/2017/sbsta/eng/l24a01.pdf*.

13 United Nations High-Level Political Forum 2018, "Transformation Towards Sustainable and Resilient Societies," accessed February 15, 2018, *https://sustainabledevelopment.un.org/hlpf/2018*.

14 United Nations High-Level Political Forum 2019, "Empowering People and Ensuring Inclusiveness and Equality," accessed February 15, 2018, *https://sustainabledevelopment.un.org/hlpf*.

15 See Hawaii's Carbon Farming Task Force within the Office of Planning, House Bill 1578, 29th Legislature, 2017, accessed February 15, 2018, *https://www.capitol.hawaii.gov/session2017/bills/HB1578_CD1_.htm*; and California Senate Bill 859 establishing the Healthy Soils Program, accessed February 15, 2018, *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB859*.

Participant List

Roundtable Organizers

Mark Conway, Program Associate, The Stanley Foundation

G. Ken Creighton, Principal Forest and Climate Advisor, Woods Hole Research Center

Jason Funk, Associate Director of Land Use, Center for Carbon Removal

Chris Meyer, Senior Manager, Amazon Forest Policy, Environmental Defense Fund

Jennifer Smyser, Vice President and Director of Policy Programming Strategy, The Stanley Foundation

Rei Tang, Program Officer, The Stanley Foundation

Participants

Teresa Anderson, Policy Officer, Climate and Resilience, ActionAid International

Frederique Apffel-Marglin, Professor Emerita, Department of Anthropology, Smith College/Founder and Director, Sachamama Center for Biocultural Regeneration

Anne-Marie Codur, Researcher, Global Development and Environment Institute, Tufts University

Jeff Fiedler, Independent Consultant, Climate Policy

Victoria Hatton, Senior Policy Analyst, International Policy Division, Ministry for Primary Industries, New Zealand

Bernice Lee, Executive Director, Hoffmann Centre for Sustainable Resource Economy, Chatham House, England

William Moomaw, Professor Emeritus, Center for International Environment and Resource Policy, Fletcher School of Law and Diplomacy, Tufts University

Christine Negra, Principal, Versant Vision

Tonya Rawe, Global Policy Lead, Food and Nutrition Security, CARE

Stephanie Roe, Senior Land Use Consultant, Climate Focus

Jonathan Sanderman, Associate Scientist, Woods Hole Research Center

Betsy Taylor, President, Breakthrough Strategies & Solutions, LLC

Martien van Nieuwkoop, Director, Agriculture, The World Bank

Caroline Wimberly, Program Associate, Brighter Green

Lini Wollenberg, Flagship Leader, Low Emissions Agriculture, Climate Change, Agriculture and Food Security

Stephen Wood, Applied Scientist, The Nature Conservancy

Daniel Zarin, Director of Programs, Climate and Land Use Alliance

Wanqing Zhou, Associate, Brighter Green

Affiliations are listed for identification purposes only. Participants attended as individuals rather than as representatives of their governments or organizations.

The Stanley Foundation

The Stanley Foundation advances multilateral action to create fair, just, and lasting solutions to critical issues of peace and security. Our work is built on the belief that greater international cooperation will enhance global governance and spur global citizenship. The foundation frequently collaborates with a wide range of organizations using different forums, formats, and venues to engage policy communities. We do not make grants.

Our programming addresses profound threats to human survival where improved multilateral governance and cooperation are fundamental to transforming real-world policy. Current efforts focus on policy improvement to prevent genocide and mass atrocities, eliminate the threat of nuclear terrorism, and drive collective and long-term action on climate change. The foundation also works to promote global education in our hometown of Muscatine, Iowa, and nearby.

A private operating foundation established in 1956, the Stanley Foundation maintains a long-term, independent, and nonpartisan perspective. Our publications, multimedia resources, and a wealth of other information about programming are available at *www.stanleyfoundation.org*.

209 Iowa Avenue
Muscatine, IA 52761 USA
563-264-1500
563-264-0864 Fax
info@stanleyfoundation.org

PRINTED ON RECYCLED PAPER 4/18 315