



Global Development and Environment Institute
Tufts University

Regenerative Agriculture: From International to Local

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Symposium Addresses Healthy Soils and Carbon Storage

The urgency of reducing carbon emissions to net zero has directed increasing attention to the crucial role of natural systems, including soils and agriculture. Many of the policies needed to increase carbon storage in soils are also very beneficial to agricultural productivity, ecosystem sustainability, and human nutrition. At the third symposium of the Northeast Healthy Soil Network (NEHSN) in March 2023, high-level panels including experts and practitioners from the US and Europe addressed the connections between international, national, and local agricultural policies for regenerative agriculture, including improved nutrient content, water retention, and carbon storage.

The NEHSN aims to create a sustained platform for farmers, policymakers, researchers, and other healthy soils stakeholders and advocates in the Northeast region, along with collaboration with international institutions such as the [4 per 1000 initiative](#). Topics discussed at the symposium included the economics of rebuilding soils, carbon storage and carbon credits, investment in sustainable agriculture, and connections to equity and environmental justice.

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In introductory remarks, [Dr. Mireille Guyader](#), Counselor for Science and Technology at the Embassy of France in the US, emphasized the importance of nature-based solutions to climate change, aimed at enhancing nature’s capabilities to store more carbon by restoring the natural capacities of soils and of agro-ecosystems, as well as promoting reforestation, afforestation, and restoration of wetlands. France has been a leading actor on the global stage on nature-based solutions to climate change. During COP21 in Paris in 2015, the French Ministry of Agriculture launched an international initiative, the [4 per 1000 initiative](#) for food security and climate, to address these issues at the global level.

Conference panels addressed major themes concerning **lessons learned at the international level, strategies for investment in regenerative agriculture, developing resilient agroecosystems, and promoting social equity in agriculture.**

The symposium was hosted by Food Solutions New England, University of New Hampshire, American Farmland Trust, the Northeast Organic Farming Association–New Hampshire (NOFA-NH), Tufts University Global Development and Environment Institute, and Dartmouth College with the support of NEHSN's international partners: the 4per1000 initiative, the Embassy of France in Washington D.C., the consulate General of France in Boston, and the French Ministry of Agriculture and Food Sovereignty.



1. Comparative Lessons Learned at the International Level

The first panel “Comparative Lessons Learned at the International Level” featured speakers Paul Luu from 4per1000, Chelsea Gazillo from American Farmland Trust, Sylvain Maestracci of the French Ministry of Agriculture and Food Sovereignty, Debbie Reed from Ecosystem Services Market Consortium, and Max DuBuisson from Indigo Ag. The panel was moderated by Dr. Anne-Marie Codur, senior researcher at Tufts Global Development and Environment Institute.

[Paul Luu](#) Executive Secretary, of the international “4 per 1000” [initiative](#), explained the work of this global platform to promote healthy soil worldwide for food security and climate. The phrase “4 per 1000” represents the goal of increasing soil carbon by 0.4 percent per year, or 4 parts per 1000, which if achieved globally would remove billions of tons of carbon from the atmosphere annually.

Luu discussed the three types of actions 4 per 1000 is taking to fight climate change, food insecurity, and to increase biodiversity: conservation of remaining natural habitats, ecosystem restoration, and change of practices prioritizing areas with high soil carbon sequestration potential.

Globally, we need healthy and carbon rich soils to mitigate climate change, adapt to climate change, and to contribute to food security and restore degraded soils. The necessary evolution of agricultural systems to achieve these goals would be a trend towards agroecology, agroforestry, and other restorative techniques. Key conservation agriculture practices would include minimum mechanical soil disturbance, permanent soil organic cover with crop residues, and species diversification through varied crop sequences.

[Sylvain Maestracci](#), counselor on forestry and ecological planification to the Minister of Agriculture and Food Sovereignty of France, explained some of the main features of the new Common Agricultural Policy (CAP) of the European Union for the period 2023-2027. As part of the larger efforts of the EU to engage in an ambitious Green New Deal, the agricultural policy of the EU promotes a low carbon roadmap by encouraging farmers to adopt soil health measures including no tillage, planting trees and hedges on fields, sustainably managing livestock, and enhancing carbon sink capacities. Many features of the new CAP are similar to those proposed for the US Farm Bill of 2023.

[Chelsea Gazillo](#), New England Policy Manager of the American Farmland Trust (AFT), presented on federal and state policies to promote healthy soils. Practices that support healthy soil include minimizing disturbance, maximizing living roots, maximizing biodiversity, and maximizing soil cover. Top Farm Bill priorities for AFT

are funding for conservation programs, long-term adoption of soil health and climate-smart practices, and support for small-scale and historically marginalized producers. Innovative state level soil health program approaches include direct support to producers (grants or tax credits), non-profit partnerships, extension agencies and/or soil and water conservation districts, and integration of agriculture into California's Cap and Trade Program or similar programs.

[Debbie Reed](#), the Executive Director of Ecosystem Services Market Consortium (ESMC), explained how a well-designed ecosystem services market can scale soil health. The Ecosystem Services Market Consortium develops cost-effective ways to measure changes in soil health as well as water quality and water quantity, helping to ensure credibility for buyers and sellers of carbon credits, and providing a funding flow for investment in regenerative agriculture. Farmers and ranchers in the US and in Canada can enter the carbon market mechanisms built by ESMC.

ESMC measures supply chain impacts, accounting and reporting, and project verification, including Scope 3 emissions, which are indirect emissions from the supply chain (88% of all greenhouse gas emissions of the corporate sector, and 90% of emissions of the agriculture sector). ESMC's members include food, agriculture, and beverage companies which buy ESMC's carbon credits to meet their commitments towards carbon neutrality or net-zero carbon goals.

[Max DuBuisson](#) from Indigo Ag presented an overview of how "Carbon by Indigo" is catalyzing regenerative farming practices. The program supports farmers in transition by compensating them fairly for carbon farming practices, with more than six million acres enrolled and \$4.6 million paid to farmers. Prices for Indigo credits have risen from \$20 to \$50 per ton of CO₂ equivalent in just two years, increasing benefits to farmers.

[See Panel 1 presentations](#) and [video link](#)

2. Investment in Regenerative Agriculture in the Northeast

The panel on "Investment in Regenerative Agriculture in the Northeast" featured speakers Gina Asoudegan of Applegate Farms, Calla Rose Ostrander of Terra Regenerative Capital, Tad Cook of Larklea, Brandon Welch of Mad Capital, and Jenna DeRario of Cornell Cooperative Extension. Moderators were Julie Davenson of NOFA New Hampshire and Steven Keleti, advocate for healthy soil legislation.

[Gina Asoudegan](#), vice president of mission in regenerative agriculture at Applegate, discussed her experience in strategy to scale natural organic meat products throughout the supply chain. Regenerative practices can reverse the

narrative for meat consumption and production: rather than being seen as an environmental and climate negative, meat production can become net positive for healthy soils and carbon storage.

Companies such as Applegate and its parent company Hormel can use their scale for good, providing a guaranteed purchasing outlet for regenerative meat producers. Gina will be leaving Applegate to begin her own business of creating regenerative supply chains that are efficiently scaled, and can provide reliable product flow for larger firms such as Applegate and Hormel.

[Calla Rose Ostrander](#), of Terra Regenerative Capital, presented on her work in system change for environmental well-being, impact investment funding, and manufacturing businesses that support the growth of regenerative farming. She discussed strategies for restructuring how capital moves to farmers and producers. Terra focuses on the missing middle: aggregation, processing, manufacturing, and distribution. Farmers need access to local and value-added marketing; without this the transition will not happen. Terra invests into businesses in the agricultural supply chain, structuring buy back or dissolution of equity later on, and it supports farmers being profitable through loan deferments.

[Tad Cook](#) of [Larklea](#) presented on his work with food processors and actors practicing regenerative agriculture, seeking to connect them to viable markets and economies. He has been working with Biological Capital on a national conservation grant in Boulder, Colorado focusing on how to take a big system and connect it with a regenerative food supply chain. Challenges included smaller farmers' need for access to resources, and working with smaller scale farmers to tip balance back to a small distributor system, bringing financial resources to local communities producing healthy crops. Over a decade, Larklea has placed \$20M+ in values driven capital into regenerative agriculture, food systems and natural climate solutions.

[Brandon Welch](#), co-founder of Mad Capital, spoke about Mad Capital's mission as a financial lending organization for regenerative farmers. Through their perennial fund and financial modeling, Mad Capital and its partner organization Mad Agriculture have been involved in accelerating the organic farming revolution, helping to create a new financial system to support farmers making the transition toward organic regenerative agriculture. Their financing model matches the transition period of farmers, is flexible, and the loan repayment is based on crop rotation. Currently Mad Capital is financing twenty-four farmers across fourteen states.

[Jenna DeRario](#), the Payment for Ecosystem Services Educator of the Cornell Cooperative Extension Tompkins County, presented on Finger Lakes Payment for Ecosystem Services (PES) Pilot Program. Finger Lakes PES work team consists of

40+ stakeholders serving as an advisory team. The two-year pilot program consists of six farmers co-creating the program, with a majority being BIPOC (Black, Indigenous, People of Color) farmers who have already implemented regenerative practices and systems on their farms. Future programming will explore long-term funding opportunities/collaborators including federal grant funding, municipal and county-wide approaches and local, sustainably oriented organizations including economic development councils and local non-profits.

[See Panel 2 presentations](#) and [video link](#)

3. Towards a More Resilient Northeast Agroecosystem

The third panel “Towards a More Resilient Northeast Agroecosystem” featured speakers Julie Snorek from Dartmouth College, Richard Smith from UNH’s Silvopasture Research, Abe Collins from Land Care Cooperative, and Ned Horning from Regen Network Development. The panel was moderated by Prof. Anton Bekkerman, Director of the New Hampshire Agricultural Experiment Station at the University of New Hampshire, and Associate Dean in the College of Life Sciences and Agriculture at UNH.

[Dr. Julie Snorek](#), a social ecologist, discussed 5 soil health principles including: minimizing soil disturbance, maximizing crop diversity, keeping the soil covered, maintaining living roots year-round, and integrating livestock into farming systems. Drivers for regenerative agriculture include fertilizer prices, the need for healthier soils, and preventing rural decay. Challenges include social pressure, land control and access, and necessary policy reform.

One growing source of finance is company-sponsored ‘carbon programs’, through which companies participating in carbon markets pay farmers for the carbon they sequester. These programs require farms to collect and share data on their farming practices, and they provide technical and agronomic support. Dr. Snorek emphasized viewing regenerative agriculture as a way of re-learning, re-connecting, and rebuilding community to instill a more inclusive future for farming practices as a whole, offering a pathway to diversity, stewardship, and a healthier community.

[Dr. Richard Smith](#), Associate Professor of Agricultural Ecology at the Department of Natural Resources and the Environment at the University of New Hampshire, presented on challenges and strengths of agriculture in the Northeast, from the perspective of agricultural ecology. Challenges include the heterogeneity of the northeast in terms of floristic zone and ecoregions, climate/hardiness zones, and topography/soil type. Strengths of farming in the Northeast include small-scale

farmers, high level of direct-to-consumer and direct-to-marker sales, short growing seasons, the region’s carbon sink capacity, and woodland cover.

A developing opportunity for Northeast farming is the integration of silvopasture agroforestry techniques, which is the deliberate integration of livestock and timber/tree cop production. Benefits of silvopastures include increased stocking capacity and animal productivity, together with maintaining and expanding tree cover.

[Ned Horning](#), a principal scientist at the [Regen Network](#)[†] presented on the Environmental Stewardship Initiative, focused on integrated grazing cases with the White River Natural Resources Conservation District. An example of this stewardship project and methodology is a grazing vineyard system in the White River Natural Resources Conservation District. The goal of this project, which combines private financial support with state and federal programs, is to transition and enhance grazing operations in Vermont, to promote soil health and increase biodiversity.

[See Panel 3 Presentations](#) and [video link](#)

4. Soil Health & Equity

Panel 4 on “Soil Health and Equity” included speakers Katie Horner of UVM Institute of Agroecology, Joy Gary from Boston Farms Community Land Trust, Orion Kriegman from Boston Food Forest Coalition, and Marty Dagoberto of NOFA MA. The panel was moderated by Karen Nordstrom and Sandra Aronson from Food Solutions New England.

[Dr. Katie Horner](#) from the Plant & Soil Science Department, Institute for Agroecology of the University of Vermont, presented on the Social Dimensions of Soil Health, including defining agroecology, discussing new research in soil health, and outlining social dimensions and principles of soil health. Agroecology is defined as the ecology of food systems and ecological principles in agriculture, and includes the social dimensions of power, equity, and justice. The social principles of soil health include equitable land access, social safety nets, and democratic governance processes.

[†] Regen Network’s mission is to be a global account system for ecosystem health and climate finance, supporting global ecosystem regeneration. Regen Network accesses opportunities and develops projects for their environmental stewardship initiative.

[Joy Gary](#) from Boston Farms Community Land Trust (CLT) presented on Boston Farms CLT's mission of land justice as food justice, focusing on turning vacant urban land into collective opportunity by supporting neighborhood farmers to grow sustainable food. Boston Farms Community Land Trust builds and protects urban farms across Roxbury, Dorchester, and Mattapan, making farms more accessible to Black and Brown farmers, and creating more economic opportunity and community health.

Opportunities for engagement with Boston Farms Community Land Trust include land access, funding access, and participatory leadership. As a company, they work to build community and advance regenerative systems through local partnerships and soil building.

[Orion Kriegman](#) from Boston Food Forest Coalition (BBFC) explained the Coalition's work promoting public agriculture and social equity. Boston Food Forest Coalition is a nonprofit community land trust that transforms vacant lots into public edible parks or "food forests". Their impact areas include climate resilience, racial equity, and community cohesion.

BBFC's work directly responds to Boston's climate crisis by investing in expanded tree canopy and biodiverse habitats. Their four-part model includes: food forest development, community land trust, stewardship teams, and education. Their stewardship education program is designed to support and engage teams to support the care and maintenance of food forest parks. As of 2022, there are 9 active food forest parks in the BBFC network.

[Marty Dagoberto](#) of the Northeast Organic Farming Association, Massachusetts Chapter (NOFA-MA) presented on climate action and agriculture at the state level. Marty, who serves as a community organizer and policy director to promote regenerative agriculture and climate justice, discussed his work in facilitating statewide advocacy coalitions and caring for and cultivating medicine and healthy soils in the ancestral lands of the Pocumtuck, which include much of current-day Hampden and Hampshire Counties.

[See Panel 4 Presentations](#) and [video link](#)

Conclusion: Towards Cooperation for Regenerative Agriculture

As the world moves towards effective responses to the climate crisis, agricultural systems must be a central focus. International attention has already begun to focus on agriculture and natural systems. Pioneering efforts such as those of the 4 per 1000 initiative are gaining greater traction in promoting conservation agriculture, agroecology, and agroforestry.

In the U.S., regenerative agriculture is a key feature of national, state, and local policy initiatives. Funding mechanisms including ecosystem services markets and carbon credits are channeling millions in investments to regenerative agriculture. Innovative state level soil health programs combine state funding and public/private initiatives. Private initiatives help provide capital for small farmers, and link them to larger processors and distributors to provide reliable markets.

In the Northeast, challenges include heterogeneity of ecosystems and topography, and economic viability of small farms. Opportunities include integration of livestock, silvopasture, and agroforestry into existing farming systems, and developing community networks for sustainable agricultural products.

The principles of agroecology should include social equity and equitable land access. Urban farming, community land trusts, and support for Black, Brown, and indigenous farmers can help diversify agriculture and lessen corporate dominance and loss of family farms.

Successful efforts at regenerative agriculture have proved the viability of community-supported agroecological models. The challenge now is to scale up the success stories, gaining support at all levels of government and through the private market, to transform global agricultural systems into positive solutions rather than contributors to climate and ecological crisis.

[See full conference agenda including video links](#)

[Contact Northeast Healthy Soil Network](#)