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# Perspectives on a Natural Capital Approach to Financing Food Systems Transformation

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# About the Milken Institute

The Milken Institute is a nonprofit, nonpartisan think tank focused on accelerating measurable progress on the path to a meaningful life. With a focus on financial, physical, mental, and environmental health, we bring together the best ideas and innovative resourcing to develop blueprints for tackling some of our most critical global issues through the lens of what's pressing now and what's coming next.

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Milken Institute Health bridges innovation gaps across the health and health-care continuum to advance whole-person health throughout the lifespan by improving healthy aging, public health, biomedical science, and food systems.

# About Feeding Change

Feeding Change activates social and financial capital, engages policymakers and industry leaders, and convenes key stakeholders to catalyze a more nutritious, sustainable, resilient, and equitable food system. Sitting at the intersection of issues impacting finance and health, Feeding Change is uniquely positioned to transform food systems and achieve better health outcomes. We curate conversations with thought leaders on food systems transformation by convening top global CEOs, entrepreneurs, investors, academics, philanthropists, community-based organizations, and policymakers to accelerate progress toward our goals.

# Table of Contents

# Introduction

Food systems span local and global ecosystems, touching every aspect of life, from nutrition and lifestyle to trade and capital markets. Food systems activities across production, manufacturing, retail, and consumption make up 12 to 16 percent of global GDP.[1] These systems support a population of 8.2 billion people, which is estimated to grow to 10.3 billion within the next 50 years.[2] Yet the financial, regulatory, and environmental underpinnings of these intricate and essential systems have created significant vulnerabilities throughout supply chains and reinforced practices over decades that have an outsize impact on personal, public, and planetary health. To enable a fundamental shift in the way global food and agriculture systems operate—economically, environmentally, and socially—$200–500 billion is needed annually over the next 10 years.[3]

Nonprofits and nongovernmental organizations (NGOs) have long called for greater financing to achieve this all-encompassing shift in food systems, which is commonly referred to in those spaces as "food systems transformation," yet the private sector and governments have been slow to use the term and meet the investment demand. This is mainly because of the scope and scale of how the systems' intersect with many aspects of industry and society. Without metrics and data points to quantify those intersections and impacts, it is difficult for companies and governments to assess and manage risks responsibly.

One approach to addressing this issue, which has gained traction among financial institutions, is natural capital accounting and investment. Natural capital can be defined as the world's stock of natural assets, such as water and land, as well as the ecosystem services they provide, including pollination by bees, water purification by wetlands, carbon storage in forests and soil, and food production from farmland.[4] As one of the largest consumers of natural resources, food systems are highly dependent on natural capital. By embracing a natural capital perspective on financing, the opportunity arises to increase public and private investments in food systems transformation while fundamentally changing how food and agriculture companies, communities, and governments operate by providing them with practical ways to consider their food supply chain risks and investments. While progress continues across the areas covered in this brief, it has not yet reached the scale necessary to fill the finance gap for food systems transformation.

# What Does 'Food Systems Transformation' Mean?

"Food systems transformation" is a term commonly used among NGOs and nonprofit organizations working in agriculture and food systems. The term describes fundamental changes needed within a food system so that it benefits people, public health, and the planet, including changes to the social, economic, relational, and political infrastructure that support the system. Feeding Change defines this idealized food system as one that is:

**Nutritious:** It makes affordable and culturally appropriate foods accessible and available to support the health needs of every individual so that all can thrive.

**Equitable:** It is designed by and for a diverse set of stakeholders so that all can participate, prosper, and benefit in a just way across all food system activities and processes.

**Sustainable:** It provides nutritional security for all while ensuring the economic, social, and environmental resources to feed future generations.

**Resilient:** It withstands, recovers from, and adapts to disruptions in a way that guarantees a sufficient supply of acceptable and accessible food for all.

Food systems transformation is less commonly used in the private sector, where terms such as "the future of food" and "sustainable agriculture" are more prevalent. In this report, we use food systems transformation to emphasize the vast scope of changes needed throughout the system, beyond agriculture and food production.

# Background

In September 2024, the Milken Institute released *Insights on Investments in Food Systems Transformation: Pathways to COP30*, which explored the state of food systems investing, the risks and benefits, and the challenges and opportunities. Based on discussions, research, and analysis, three actionable opportunity areas emerged for collaboration and activation ahead of COP30: (1) make food systems conversations finance-forward, (2) synergize public policy with private capital, and (3) set up COP30 for success. Poised at the intersection of issues impacting finance and health, the Milken Institute's Feeding Change, with support from Manulife Investment Management, was well positioned to explore the actionable opportunity area of "make food systems conversations finance-forward" and provide greater context and direction to encourage progress.

With this aim in view, Feeding Change convened a series of five public and private conversations across Milken Institute events in Singapore, Mexico, New York City, and Washington, DC, as well as more than 30 interviews with key stakeholders from various sectors, to gain a better understanding of the challenges and levers to achieve the goal. The quotes throughout this brief come from those events and conversations. Informed by extensive background research and qualitative analysis of the various sessions and interviews, this brief seeks to investigate and illuminate the approach of investing in natural capital through a food systems lens by defining commonly used terms and use cases, discussing various perspectives on how this type of financing can be measured and deployed strategically, and highlighting challenges and opportunities for how the approach can be part of investment strategies that leverage food systems solutions to adapt to and mitigate climate changes.

This brief is intended to bridge a gap in understanding between two groups that are integral to driving food systems transformation: investors who are actively investing in climate solutions yet are unfamiliar with how food and agriculture systems can serve as a powerful climate solution, and food systems stakeholders who understand the key pain points throughout the food supply chain and what must change to reduce costs, improve health, and increase resilience, yet who struggle to communicate these challenges and investment opportunities in a way that resonates with investors.

# Food Supply Chain Trends

Food systems are essential for life and livelihoods, yet the way the sector operates is natural capital-intensive, relying on 40 percent of the world's habitable land, 70 percent of freshwater withdrawals, and 15 percent of fossil fuels.[5] Agricultural practices, policies, resource agreements, climate changes, and consumer demand shape how natural capital is used and consumed throughout the food supply chain. The food system's dependency on these resources amid changing environmental conditions makes it increasingly vulnerable to a number of risks, from diminishing resource availability and sourcing challenges to rippling import and export

implications that could affect national food security for countries around the world. With this in mind, managing natural resources in a way that preserves rather than degrades them is essential for the long-term viability of cropland and food supply chains.

## Factors Affecting Supply and Demand

Historically, incentive structures and procurement policies have had an immense impact on the choice of crops to grow and how they are farmed by directing the flow of money through the food and agricultural supply chain. Federal farm subsidy programs, which provide both indirect and direct support for farmers, mostly support large commodity crop producers. According to the Environmental Working Group Farm Subsidy Database, soybeans, corn, wheat, and cotton represented 74 percent of the crop insurance payments US farmers received from 1995 to 2022.[6]

Procurement policies are another mechanism by which governments influence farmers' crop choices. For example, China's minimum procurement price program guarantees that farmers reap a profit from crops such as rice and wheat to increase grain production and localize parts of the food supply.[7] Directly incentivizing the production—and often overproduction—of these commodity crops indirectly encourages their continued production and increases fertilizer, pesticide, and herbicide use. While these practices and inputs boost production and provide cheap pest and weed management, overuse of these chemicals, as well as the lack of crop diversity, may reduce the quality and longevity of the natural capital assets on which agricultural production depends, creating risks for businesses across the food value chain.

As climate conditions shift, agriculture production worldwide is also changing: the suitability of some crops for some geographies is decreasing, whereas the suitability of others is increasing. While growers must adapt to changing conditions and embrace a new "normal" of unpredictability, food and ingredient companies must reevaluate their sourcing strategies. Because of natural disasters and the spread of disease, Florida's orange production fell by 92 percent between 2003 and 2024, requiring companies to shift their supply needs to Mexico and Southern California orchards.[8] One expert we interviewed noted that changes in seasonality pushed berry harvests weeks later in some areas and weeks earlier in others, leading to temporary undersupply and then oversupply in the market, reducing sales then reducing prices, which cut into profits.

Companies are becoming aware of the scale and scope of these challenges and recognize the impacts that a changing food production landscape has on their supply chains and the consequent need for greater resiliency. One expert representing the research arm of a large financial institution summarized it simply, "They have to: it's their supply chain."

Growing competition over land utilization presents an added consideration for agricultural value chains. While farmland is being lost to urbanization worldwide, the remaining available arable land faces competing uses: landowners and investors can choose to prioritize land for livestock cultivation, conservation, crops, feed, fiber, fuel, or energy, depending on what they think will give them the greatest return—financial or otherwise.[9] Farmers and farmland managers are also exploring ways to combine land uses to maximize benefits and monetization, such as through solutions like agrivoltaics and agroforestry. Given the importance of ensuring a global food supply that can meet the nutritional needs of a growing population, it raises the question of whether proper valuation of the land and its resources can help inform which use cases are prioritized.

> **"There is very real competition for land and who owns accountability for prioritization of that land, and that goes beyond how the natural capital is invested in it. It's about what is prioritized: Is it used for bioenergy, which is a government priority? Is the priority conservation, mined materials, or the foodscape? There is so much that land as an asset class can be used for. Natural capital conversations must take place with an understanding of how the land can be shared and provide value for different types of communities."**
>
> **DIANE HOLDORF**
> Executive Vice President, Pathways, World Business Council for Sustainable Development

Changing consumer demand can also play a role in shaping agricultural uses and impact natural capital assets. Some food experts believe that consumers, motivated by increased attention to agricultural practices and sustainability, will change their purchasing behavior to reflect these values. One report from the Food Industry Association (FMI) revealed that sustainability factors are influencing shopper decisions and food purchases.[10] Some businesses have constructed their business model around generating more sustainably produced foods at premium prices, while one food system leader suggested levying a carbon tax on foods to reflect their true cost. However, given inflationary pressures and consumer interest in saving money, perspectives are mixed on whether values translate into actual purchases and whether shifting consumer demand will adequately change pressures on natural resources.

## Impact on Imports and Exports

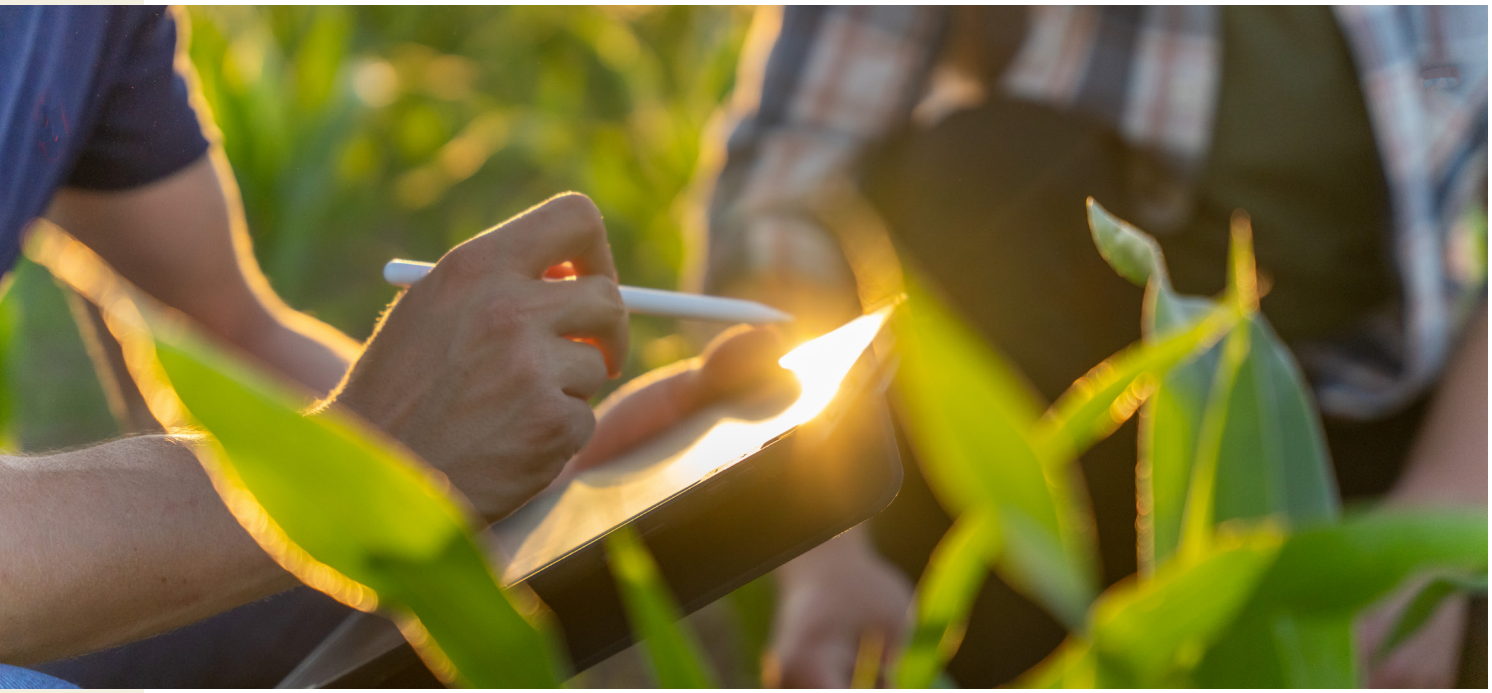
Trade around the world has nearly quintupled over the last half century; according to the UN Conference on Trade and Development, countries are trading 134 times more goods than they were 60 years ago.[11] With this increase in trade has come an increased frequency of disruptions to the global supply chain due to geopolitical conflicts, natural disasters and extreme weather

events, environmental changes, and shifting social, financial, and political trends.[12] Many countries across Asia, South America, and Africa are dependent on commodity exports, making them even more vulnerable to these disruptions when they occur.[13] Agriculture represents more than 60 percent of exports for countries such as Ethiopia, Somalia, Uruguay, Argentina, New Zealand, Afghanistan, and others, while China, the US, the EU, the UK, and Japan comprise the largest importers.[14] As climate change and resource availability impact food supply chains, importers and exporters, companies, and countries will need to consider the risks to continuing business as usual.

One agricultural expert emphasized the need for stakeholders to grasp the magnitude of the impact that disruptions of a single export staple in one country could have on the global market. For example, in 2023, India's government banned exports of non-basmati white rice in response to significant crop damage from extreme weather, triggering fear of increased prices and food insecurity throughout the Asian market, particularly for countries like the Philippines, Malaysia, and Vietnam, which are all highly dependent on India for their rice.[15] Large countries with robust agricultural industries, such as the US and China, were not affected as much; yet a similar scale of disruption in a country like Mexico, which is the largest exporter of fruits and vegetables to the US, would severely impact the availability and affordability of nutritious foods required to sustain a healthy population.[16] To reduce reliance on import partners and strengthen resiliency, some governments are creating programs to incentivize local and regional food production.[17] Yet, for most countries and regions throughout the world, there will be limitations to what they can grow in their unique climates.

> **"Food production is both vulnerable to climate change and can be a powerful tool to combat it. Regenerative agriculture, when done right and at scale, can be one of our greatest climate solutions. By prioritizing soil health, we can farm in ways that sequester carbon while also increasing the quantity, quality, reliability, and resilience of our food system."**
>
> **CRAIG WICHNER**
> **Founder & Managing Partner, Farmland LP**

Experts disagreed on how fast the private sector needs to move to address these supply chain vulnerabilities. Some argued that they are trying but moving slowly, in part because understanding the extent of the risks of a complex, expansive, and fragmented global supply chain is incredibly difficult and not the function of near-term-focused private enterprise. Others noted that existing or anticipated policy changes are causing some in the private sector to "desperately" seek out new tools for measuring and quantifying the risk, the better to assess their readiness to adapt to disruptions.



# Make Food Systems Conversations Finance-Forward

Across discussions with experts in finance and food and agriculture systems, a fundamental challenge emerged: a lack of common language and understanding is preventing strategic and tactical investments in food systems transformation. In fact, there is an overabundance of terminologies and classifications of climate risks, food systems solutions, and the ways they intersect. Ultimately, the crux of the conversation comes back to the need for significantly more financing. Therefore, food and agriculture system stakeholders should consider embracing the language, systems, and tools of the finance sector to encourage greater investment.

The following section outlines the various perspectives of stakeholders with whom the Milken Institute hosted discussions to develop this brief. It explores the qualitative and quantitative approaches investors are taking to assess food supply chain risks through the lens of natural capital and invest accordingly.

## Seeking a Common Language

Conversations on food systems transformation and investments leverage a number of different terms: regenerative agriculture, sustainable agriculture, nature-based solutions, agroecology, decarbonization, natural capital accounting and investing, and many others. Some of these are used interchangeably, some elicit strong visceral reactions, and some lead to

head scratching. The experts we spoke to at least agreed on the following: (1) conversations are too siloed, stifling progress; (2) language discrepancies are part of the problem; and (3) consensus on a term that makes everyone happy will likely never be achieved. Given that food systems transformation depends on a significant increase in capital, particularly at the scale that large investors offer, it is worth considering whether stakeholders seeking investments in food systems initiatives should embrace the language that financiers use to accelerate investments and, therefore, progress. In other words, make conversations about food systems transformation finance-forward.

Natural capital, a term that has been around for several decades, seems to have been used more often in the last five years or so, based on the frequency of references to it in recent publications from a range of top consulting and financial groups. Natural capital and related usage—such as referring to natural resources as assets and quantifying their values—appeal to financiers because they integrate with the quantitative approaches financiers use to assess and measure risk, supply chain, and investment strategies, as well as regulatory requirements. Being able to assign a quantifiable value to various assets allows for calculations of risk and impact, while also supporting the integrity of trading systems such as carbon or biodiversity markets.

Whereas some investors embrace a natural capital approach to accounting, measurement, and investment for its quantifiable, certifiable, and disclosure-friendly structure, food systems experts emphasize the systems impact and the nuances that are critical to food systems functioning across the globe, from smallholder farms and locally dependent challenges to the issue of large-scale, conventional farming and subsidies that dominate the global food system incentives and market structures. They are wary of leaning into a capital system that they view as extractive and exclusive, and voiced concerns about how this type of valuation might keep less powerful stakeholders out of the system or ignore social and equity considerations, such as Indigenous practices and rights. Though this is the perception, multiple definitions of natural capital include taking into account the benefits of the ecosystem and social services that the natural resources provide. Nonetheless, food and agriculture systems experts largely preferred nature-based investing or regenerative agriculture, which resonates more with language that they are used to and focuses on outcome-based rather than input- or practice-based assessments.

# Definitions and Distinctions: Natural Capital, Nature-Based Solutions, Decarbonization

## Natural Capital

Natural capital is defined as the collection of our planet's living and nonliving, renewable and nonrenewable resources, including soils, water, air, and minerals. These resources and their interactions result in environmental services that provide value to ecosystems and humans. Natural capital management approaches include, but are not limited to, precision agriculture, drip irrigation, and soil sequestration monitoring programs, all of which are examples of technologies and techniques that allow food producers to use resources more responsibly. Investors may manage a natural capital asset, such as farmland, by increasing the value of the land through regenerative practices or conversion to premium crops, such as organic, and generating carbon credits.

## Nature-Based Solutions

Nature-based solutions (NbS) are concerned with improving, protecting, and managing ecosystems and agricultural lands to deliver benefits to humans and biodiversity. Examples of NbS include integrated pest management, watershed protection, and sustainable agricultural practices such as cover cropping, intercropping, and agroforestry. NbS emphasize the role of nature and natural processes to deliver improved outcomes for humans and ecosystems. There is disagreement around which solutions derived from natural sources qualify as NbS, such as in the case of biofuel, which, despite its potential to reduce emissions, may negatively impact biodiversity outcomes.

## Decarbonization

Decarbonization refers to reducing carbon emissions across the food supply chain through carbon storage or emissions reduction. Examples of practices that support decarbonization include regenerative agriculture, which may lead to the storage of carbon in soils, or converting energy operations to renewable sources to reduce emissions.

Natural capital and NbS are similar in that both approaches value the natural resources and corresponding environmental services that enable functioning food supply chains and benefit humans. These approaches differ: a natural capital approach to food systems emphasizes the economic-appreciation value of nature as an asset. Decarbonization is related to natural capital and nature-based solutions insofar as efforts to improve the value of farmland or increase biodiversity outcomes may also result in carbon storage in soils or emission reduction.

# Valuing and Managing Natural Capital

Natural capital includes a host of different resources and ecosystem services, such as land, water, carbon, soil health, biodiversity, and many others. With proper valuation of these various resources and services, farmers, landowners, companies, and governments can, in theory, make informed decisions about how to prioritize resource use and structure investments. It is also worth noting that valuation in this context is not exclusively monetary but, rather, refers to some quantifiable metric that can be consistently measured, assessed, and documented.[18] One financial expert used water as an example to illustrate this point, saying, "I would argue that the food system treats water as an input to a process to produce food without properly valuing it. Once you properly value water as a natural capital asset and include it as part of the overall system, you'll start to see a proper, rational approach to water scarcity and oversupply."

However, other experts doubted whether valuation would generate better prioritization decisions. One person interviewed noted that companies have historically been rewarded for taking a linear approach to extraction and management, which has prevented them from taking a broader systems lens to understand the full scope of value, benefits, and risk. This contributor expressed the importance of approaching the challenge from a shared-dependency perspective, considering the communities and other stakeholders that also have a stake in the valuation.

Experts emphasized that the valuation and management of these resources and services require collaboration between the private sector and governments. Where the private sector is well positioned to drive valuations and establish markets, governments have a role in providing checks and balances for all stakeholders. Because of how undervalued these resources have been so far, a "proper" valuation could mean significant price increases to necessary inputs for food production, which would have an outsize negative impact on smaller producers.

Governments could support these producers by subsidizing costs or providing tools, additional incentives, and capacity-building support to smaller businesses and nonprofits to offset the higher costs. That said, it is worth noting that government subsidies have also historically created their share of imbalances in the market, and reversing those imbalances in existing areas may reduce the need for them in new areas.

> **"Food production is not a space where you can get the top 10 companies to agree to do something, and the rest of the industry is just going to follow suit. It's one where you need accelerant policy to reduce the friction costs or share the burden of the smallholders to make the changes necessary."**
>
> **PETER TANG**
> **Chief Financial Officer, Butterfly Equity**

At the moment, multiple groups, particularly in academia and the nonprofit space, are working to figure out true cost accounting (TCA) for the food system and natural capital accounting (NCA) tools that the private sector and governments can then use to inform supply chains, risk management, and policies and regulation. However, we are still years away from being close to even a single proper valuation system for just one resource. The areas that have made the most progress and have received the most attention, let alone investment, are land (farmland and timberland), water, carbon, soil health, and biodiversity, as evidenced by the number of certifications and standards that have emerged over the past few years. Greater investment in this research across the public and private sectors is needed to accelerate fair valuations, which include consideration of interdependencies, so that stakeholders can more effectively manage and share resources.

# True Cost Accounting vs. Natural Capital Accounting

**True cost accounting** is defined by the Global Alliance for the Future of Food as "a systemic approach to measure and value the positive and negative environmental, social, health, and economic costs and benefits."[19] When applied to food systems, it helps to illustrate the scope of benefits and costs to all stakeholders across the entire food value chain and illuminate the hidden costs, or externalities, that can be missed by traditional accounting frameworks. A United Nations (UN) Food and Agriculture Organization 2024 *State of Food and Agriculture* report revealed $11.6 trillion in hidden costs in 2020 for the global agrifood system.[20]

**Natural capital accounting** is defined by the World Bank as "part of broader wealth accounting, integrates natural resources, economic valuation and analysis, providing a better understanding of development progress and its impacts on society and environment than standard measures such as Gross Domestic Product (GDP)."[21]

While both frameworks support policymaking and financing decision-making, NCA has been in development and use by governments, researchers, and businesses for several decades, whereas TCA has gained traction more recently, particularly when applied to food systems. TCA is broader and more nuanced, taking into account social and economic factors in addition to the environmental considerations, whereas NCA is specific to the valuation and measurement of natural resources and their ecosystem services. Because the food system intersects and impacts so much more than the environment and natural resources, TCA is viewed by its proponents as a way to improve the way food is priced so that it accurately reflects all related externalities and consequently incentivizes more resilient and sustainable shifts in policy, practices, and investments.

# Measuring, Monitoring, Reporting, and Verifying

Among the investors interviewed, one refrain came up repeatedly: "You can't manage what you can't measure." Proper measuring, monitoring, reporting, and verifying the status and value of natural capital assets are crucial for companies and policymakers to take informed actions and maintain accountability. These data are necessary for benchmarking and then tracking changes over time, especially as investors want to see how certain investments or changes to operations impact outcomes. It also gives regulators important data to determine where outcomes can be incentivized or disincentivized.

To help track those outcomes and data points, companies noted partnerships with a range of nonprofit and technology organizations that provide technological solutions for measuring pesticide use, water consumption, soil health, and carbon sequestration, among other metrics. These solutions include AI tools and satellite technology to track resource usage and emissions as well as frameworks, certifications, and standards based on a set of practices or outcomes.

In this way, some experts argued that a qualitative definition is less important than quantitative agreement on how the various elements of natural capital are measured, valued, and reported. Areas making the most headway in this regard are regenerative agriculture and greenhouse gas emissions, particularly carbon. In our interviews with experts, regenerative agriculture was the predominant approach to sustainable and resilient farmland management. Various standards and certifications exist for practices and/or outcomes.[22] These certifications are important for establishing the authenticity and integrity of the asset.

An outcomes-based approach was most favored by stakeholders in our interviews because it allows for more flexibility regarding the practices a producer employs to achieve the desired impact, especially when considering differences in growing conditions around the world. This also aligns with some investor views that "investors need to know that the outcomes are being achieved versus what specific methods are being used to demonstrate those outcomes."

Once a sense of valuation is determined based on a standard methodology, the asset can be sold to the markets through a variety of methods, including a credit. Carbon credits, for example, are an emerging asset that previously had not been valued, with new market systems set up to trade them. Large companies such as Microsoft, Google, Unilever, Apple, Nestlé, General Mills, Cargill, and others have invested in carbon credits from food production as part of their sustainability commitments. However, one expert noted that generating carbon credits from regenerative agriculture had been "completely broken" for farmers who adopted the practice of intentionally diversifying their crops to achieve desired regenerative agriculture outcomes. Each crop requires a different certification protocol, making it costly and cumbersome for producers to certify the variety of products.

This also holds true as a barrier for smallholder farmers because they may not own the land that they farm, and even if they do, they grow a variety of crops to provide food for their families and income. That said, there are examples of recent investments from large companies intended to advance protocols to generate carbon credits from regenerative agriculture practices, as well as other successful initiatives like afforestation and biochar.[23]

While valuable for collecting critical data and ensuring the integrity of assets, technology solutions and certifications have their fair share of challenges. Data collecting and reporting technologies, such as remote sensing, that are used to help with reporting for certifications or other benchmarking are expensive to deploy and can be cost-prohibitive to many farmers, as well as create a lack of trust when investors are privy to data generated from their farm without visibility into what the data mean and how they are being used. However, the alternative process of manually collecting data can also be burdensome to many producers. Farmers already participate in a number of regulatory and financial reporting processes and are often "reported out." These are areas where investors and businesses can provide more financial incentives for their suppliers and producers to integrate new technology that alleviates the burden of data collection, while employing agriculture experts who can work with the farmers to help manage and put the data into context.

> **"What we don't do is value the carbon stored on the farm. We don't value the water conservation that efficiently manages the need for water. We don't value the contribution to local communities that the farm and that investment make relative to it. So we have to start to value these additional benefits that natural capital, or in this case, farming, provides, in order for investors to want to put more capital into it."**
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> **BRIAN KERNOHAN**
> **Chief Sustainability Officer, Manulife Investment Management**

## Leveraging Markets to Incentivize Transformation

Experts interviewed frequently brought up carbon and biodiversity markets as examples of the most developed types of markets for a natural capital asset. At the time of this publication, though, views differed on the prevalence and maturity of biodiversity markets.

There are two types of carbon markets: voluntary, where buyers and sellers are connected through a third party, and compliance, where governments impose limitations on emissions, known as cap-and-trade programs.[24] Buyers, typically large corporations, can purchase credits to offset their carbon emissions as one way of working toward their net zero emissions targets. Sellers include farmers, landowners, companies, public-sector entities, and nonprofits that generate credits through their investments in carbon sequestration projects, conservation and restoration, reforestation, regenerative agriculture practices, and more. Selling these credits provides additional financial incentives to encourage more investment in these types of projects and production methods.

Although there are more voluntary markets in operation, compliance markets make up the lion's share of total market value. These are most common in areas that have strong regulatory frameworks, such as the US, EU, China, Australia, Canada, Japan, and others.

In theory, markets such as carbon markets would help to price carbon properly, which would then translate into changes to on-the-ground practices throughout company supply chains, either to reduce costs related to emitting carbon or gain value by capturing carbon. The same would be true for markets for water, biodiversity, or soil health. Once properly valued, companies would be forced to review their operations and sourcing to account for these costs. Experts emphasized the importance of the private sector in informing these markets because the private sector is what creates value from those assets. However, experts experienced in working with Global South and Indigenous producers cautioned against so much private-sector influence on these markets because benefits do not trickle down equally.

As noted in the previous section, most smallholder farmers cannot receive any benefits because of land ownership challenges. Additionally, the privatization of resources that could result from this type of market-based solution could lead to exclusion of the use of resources by Indigenous

groups or other smaller producers for whom the costs prohibit use of the resources. Ultimately, the concept of markets and assets relies on a premise of ownership, and many groups would be left out as a result. This is where public-sector involvement could help create policies that regulate the markets and make them more accessible to communities that would otherwise be unable to participate.

Another market opportunity for food systems investment, which several experts mentioned, was biodiversity markets. Despite being around for decades, these markets are much less prevalent than the carbon markets and began gaining traction among food systems stakeholders in recent years alongside other pushes toward more sustainable and nature-positive production strategies. The challenge with biodiversity markets, and generating the credits that would fuel them, is that there is not one measure for biodiversity, which is localized, as opposed to carbon, which is global. As a result, it is difficult to ensure quality and consistency for the credits as well as the integrity of the long-term positive outcomes that the credits are meant to support. That said, organizations such as the Taskforce on Nature-related Financial Disclosures are working to create a framework for measuring this for investors.[25]

In the creation of these biodiversity markets, experts cautioned against following too closely on the trail of the carbon markets. Whereas experts see carbon markets as relatively straightforward—carbon is easier to quantify than biodiversity, and the goal of the markets is to achieve net neutrality—they hope that biodiversity markets can take a more holistic approach to environmental health to achieve a net positive outcome for ecosystems. Some experts noted that a challenge with this approach for food systems production is the difficulty in valuing biodiversity and then measuring and monitoring these outcomes over the long term to maintain the integrity of the market. This brings us back to the need to value natural capital assets in order to properly measure, manage, monitor, report, verify, and trade them. Though these financial structures provide a promising framework for doing so, there is still a significant amount of work that needs to be done if they are to function in a way that can generate positive results for all stakeholders in the food and finance systems.

> **"We need to be able to measure the data and disclose it in a consistent and credible way. There is a big disparity in the voluntary carbon markets today related to carbon pricing: there are pretty evident differences you would observe if you compared the pricing in China, Singapore, and the US. Figuring out how to price consistently on a global level is really, really critical if we want to see significant strides made toward carbon neutrality."**
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> **MELODY WAN**
> Chief Executive Officer, Asia, Rabobank

# Recommendations

The UN Framework Convention on Climate Change Conference of the Parties (COP) has played an important role in recent years in elevating food on the international agenda as both a contributor to, and recipient of, climate change impacts. Great strides have been made over the last few COPs, marked by the establishment of a dedicated Food Systems Pavilion for the first time at COP28 and again at COP29. With COP30 on the horizon in November 2025, there is an opportunity to expand beyond the dedicated Food Systems Pavilion and integrate food systems perspectives, considerations, and potential solutions into the negotiations of goals, agreements, commitments, and financing to address the role that food systems play in mitigation, adaptation, national security, and more.

Just as investors and food and agriculture systems stakeholders seeking capital must find shared approaches to valuing, managing, and measuring the returns and impacts of investments in food systems transformation, so, too, do policymakers across the world need to understand how to account for the risks, impacts, and opportunities of food systems policies on their national security and global supply chain dependencies. As one of the largest exporters of food products, Brazil is well positioned to host COP30 and differentiate itself from past COPs by making concerted efforts to incorporate a food systems lens meaningfully into broader conversations and any agreements, resolutions, declarations, commitments, and other outcome documents. There is also an opportunity for influential conveners, such as think tanks and advocacy organizations, to bring together the public, private, and nonprofit sectors to help drive these conversations before and between COPs for greater impact. The following sections outline finance and policy levers that could help to support these conversations to increase resilience, reduce risk, and support food systems transformation.

## 1. Engage Policymakers to Strengthen Supply Chain Resilience Measures

Policy, at all levels of government and internationally, is critical for supporting, enforcing, and regulating the various natural capital approaches discussed in this brief. Policy can help build guardrails for private-sector influence on markets and provide an incentive—or disincentive—structure that helps encourage best practices for resilient and sustainable management of shared natural resources for stakeholders of all sizes and scopes across the food supply chain. Experts cited several policy needs that could help to encourage more active participation from the private sector, reduce environmental risks for producers and incentivize them to employ sustainable management practices, and encourage measures that protect food supply chains from a national security standpoint. One policy area that came up in several conversations with experts was the need for new crop insurance policies, which experts asserted would support producers and save the government money by reducing the costs of unexpected crop loss caused by extreme weather events. Yet more research is needed to understand what these policies would look like to support nature-positive food production.

Another potential policy area that came up was the need for governments to establish a minimum set of standards to help increase natural capital investment and liquidity. Expanding on the research and discussions initiated through this brief, the Milken Institute's Feeding Change will develop a policy brief outlining priority opportunities for food supply chain resilience measures and bring together stakeholders from the public, private, and nonprofit sectors in a policy dialogue to discuss them and identify paths forward.

## 2. Create an Investor Guide Series for Investing in Natural Capital Management Through Food Systems

Experts referenced the lack of investor knowledge of food systems, particularly from a natural capital perspective, as a major barrier to more investment. Multiple experts suggested the development of a series of guides that would cover what food systems are and how they apply to each level of an asset owner's decision-making, from how it fits into the portfolio, the role it can play compared to other asset classes, and the different sub-asset classes in terms of risk and return, to the due diligence needed to understand likely future performance, how to monitor the investment on an ongoing basis, and how to achieve the best outcomes. While several investment guides and screening tools exist related to regenerative agriculture and livestock production, as well as broad, systems-wide reports on financing food systems, this series for investors could focus on a natural capital lens looking at other specific investment opportunities across the food supply chain.[26] Such a series, particularly one developed by independent finance experts with food systems expertise supporting the development, could help catalyze more investments, particularly from climate finance-minded institutional investors.

# Conclusion

Approaching food systems transformation from a natural capital lens has the potential to increase much-needed investments. Although the natural capital language itself does not resonate with all stakeholders, it does lend itself well to the way investors already think about their investment risks and strategies. By understanding the benefits and challenges of this approach, seasoned food system experts and experienced investors can better communicate to drive stronger and more sustainable financing solutions across the food value chain. There is value in the disagreement as well—acknowledging the limitations of an approach can help to ensure that additional actions are taken to compensate for those deficits, such as having private-sector partners take on the financial burden of upfront investment costs in on-farm data collection technologies and then implementing transparent processes for sharing the meaning and impact of that data with the producers whose farms generated those insights. By improving communication and understanding across the food systems and finance communities, stakeholders can better collaborate to create food systems that are resilient and provide positive social, economic, and environmental impact, while generating significant financial returns for investors.

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