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100 Million Farmers: Breakthrough Models for Financing a Sustainability Transition

INSIGHT REPORT
JANUARY 2024



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Foreword



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There is a leadership imperative to urgently and thoughtfully reshape how we produce and consume food to make our food systems more sustainable and resilient. The requisite climate-smart and nature-positive production practices, technologies and inputs are increasingly well understood. What we must address together is how to support producer communities and value chains to meaningfully accelerate and sustain the adoption of these production changes. Faster adoption will drive progress on the Paris Agreement's 2030 global climate goals, possibly ahead of any other sector, and alleviate the stresses on one of our most scarce resources – water.

Individual farmers face many barriers – particularly economic risks – when adopting more sustainable production practices, technologies and inputs. This report seeks to accelerate the transition by proposing a clear roadmap for more effective collective action. Crucially, successful transformation requires a major boost of diversified capital and breakthrough models of financing and collaboration to support farmers. Many actors (public and private, within food value chains and beyond) have essential roles to play in providing that capital and deploying it effectively. Using regenerative agriculture as an example – a critical part of the transition to sustainable food systems in its own right – the report proposes a model and roadmap for more effective coordination among these actors. The model supports farmers by

providing a flexible set of financial and non-financial services and enables a broad set of actors to share the risks and rewards of regenerative agriculture.

This report presents a roadmap for navigating these transition challenges. It takes inspiration from many promising existing programmes that are already delivering positive results. It builds on a large and growing body of existing research and thought leadership, including *Green Returns: Unleashing the Power of Finance for Sustainable Food Systems*.¹ It draws on the experience of many practitioners in the public, private and non-profit sectors. We would especially like to thank the members of the World Economic Forum CEO Alliance for Food, Water and Health and the contributors to the 100 Million Farmers Finance Task Force for their knowledge and leadership.

This report will be presented to leaders in the business, government and social sectors at the World Economic Forum Annual Meeting in Davos, Switzerland, in January 2024. Alliance members intend to begin implementing the model described in this report, starting with one or more pilots in 2024. This implementation is part of the 100 Million Farmers platform, which accelerates sustainable agri-food practices and supports private and public sector leaders in collective action efforts that position food and farmers as central pillars of the global climate and nature agenda.

Executive summary

A breakthrough model of financing and collaboration supporting farmers can speed up the transition to sustainable food production.

Global food systems need to shift rapidly to more sustainable forms of production as part of broader food system transformation efforts.² Food systems accounted for more than 30% of global greenhouse gas emissions in 2020,³ over 80% of tropical deforestation⁴ and biodiversity loss⁵ and 70% of global freshwater withdrawals, often from already-stressed river basins and groundwater reserves.⁶

The production changes – practices, technologies and inputs – required to improve the climate, water and nature footprint of the food system, improve resilience and help restore the planet are increasingly well understood. The key question is how to make the adoption of these production changes happen at the scale and pace required to meet global goals on climate, water, nature and food security.

At the heart of this challenge are the barriers to adoption – particularly economic barriers, in addition to technical and social challenges – that farmers face. Adopting new farming approaches frequently requires new inputs, equipment and technologies. Following adoption, farm yields and profits can often get worse before they get better. Current financing systems and models do not sufficiently address these barriers.

A rapid and large-scale transition will require much more capital. Globally, the full food system transformation needs an additional \$300 billion to \$350 billion in capital investment annually through 2030.⁷ Even though this investment has an expected societal return of more than 15 times and food and agriculture account for a significant share of global greenhouse gas emissions, less than 4% of climate finance in 2021 and 2022 was dedicated to agriculture, forestry and other land use.⁸ However, additional capital investment alone will not be enough to accelerate progress and sustain change. Capital and capabilities must also be coordinated and deployed more effectively to address economic, technical and social barriers to farmer adoption.

This report proposes a breakthrough model for financing and collaboration to support farmers, with a specific focus on their adoption of regenerative agriculture (defined as a context-dependent system of farming practices that delivers or improves ecosystem services and economic outcomes):

- **What support do farmers need to adopt regenerative practices?** Farmers should be offered a flexible stack of financial and non-financial services from which they can select the support they need based on their specific context. Financial support should include lending and insurance on favourable terms to reflect that the adoption of regenerative agriculture can reduce risk exposure for financial actors. Farmers also need upfront payments or guarantees that can defray the economic risks they encounter during the early years of practice adoption. Non-financial support should include technical assistance, data services and access to equipment and inputs.
- **How should support be funded?** To support the adoption of practices and sustain their implementation, a key source of financing should come from the monetization of the full value of all ecosystem services delivered by regenerative practices, including improved resilience and environmental outcomes like healthier soils, carbon sequestration and greenhouse gas emissions avoidance, reduced freshwater use and pollution, and enhanced biodiversity. In exchange for ecosystem services, all the actors that benefit from regenerative agriculture, including value chain participants (across crop rotations), lenders and insurers, and governments should provide financing. To support initial investments in farmers' financial and technical support for multiple years before environmental outcomes are realized, additional capital must be aggregated from public and private sources, including catalytic, concessional and long-term investment.
- **Who should provide the capital and delivery of support?** Engagement from a broad set of actors is critical, starting with financial actors and others with the advanced financial capabilities needed to assess, pool, price and manage risk, aggregate capital, monetize ecosystem services and re-engineer cash flows for farmers. One or more actors must also be the catalyst for coordination. Coordination is needed to simplify the adoption process for farmers, to assemble the diverse set of actors that have a role to play and stand to benefit from the adoption of regenerative agriculture on a given acre and to demonstrate the value proposition of being involved to all participants.

Research on over 50 existing regenerative agriculture programmes in the US shows none includes every critical element. However, several innovative farmer finance programmes are implementing some of these elements. These programmes, particularly those involving grower associations, provide rich lessons and exciting opportunities for future development.

Five actions will accelerate the implementation of regenerative agriculture at scale:

1. **Build out, scale up and replicate breakthrough models for financing and collaboration (as articulated in this report).** Build on existing initiatives with the right foundational elements – particularly participation from essential actors like grower associations – and add the critical missing elements.
2. **Promote the engagement of financial actors in the adoption of regenerative agriculture.** With the right capabilities in place, financial services actors can reduce their risk exposure and open up new business opportunities while turbocharging regenerative agriculture programmes.
3. **Structure precompetitive collaboration among value chain companies to aggregate demand for environmental outcomes and improved farm resilience.** Develop or expand coordinating mechanisms to ensure that all the ecosystem services resulting from regenerative

agriculture are fully valued and every actor that benefits is committed to contributing through payments for environmental outcomes and, potentially, procurement arrangements.

4. **Establish a consistent and supportive policy and enabling environment.** Use policy levers to strengthen the business case for private sector companies, investors and farmers to expand the use of regenerative agriculture practices and invest to provide catalytic capital for promising programmes and innovations and to develop the agricultural commons (i.e. intellectual assets, human capital, physical infrastructure).
5. **Develop a data commons and accelerate marketplace development for all ecosystem services.** Advance the definition, standardization, measurement, reporting, verification and availability of data linking regenerative practices to economic outcomes for farmers, environmental outcomes and resilience to enable the scaling of markets and mechanisms to fully monetize the ecosystem services resulting from regenerative agriculture.

Real progress on the faster adoption of regenerative agriculture and greater sustainability across all forms of agriculture is within reach. Breakthrough models for financing and collaboration can ensure farmer support is delivered when and where it is needed, as efficiently and equitably as possible, and at the scale and pace needed to drive a lasting transformation.

1

Navigating the transition to sustainable food production

Financing and collaboration models must address the economic, technical and social barriers farmers face to accelerate sustainable food production.



1.1 The need for a faster transition

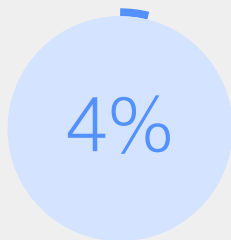
The world's highly productive food systems generate more than enough food to feed everyone on the planet⁹ but account for more than 30% of global greenhouse gas (GHG) emissions¹⁰ and exact a substantial toll on nature in many parts of the world. About half of agri-food system emissions (14% of GHG emissions in 2020) come from crop and livestock production activities within the farm gate.¹¹ Additionally, food systems represent 70% of freshwater withdrawals globally, often from already-stressed river basins and groundwater reserves.¹² Changes to farming practices have a vital role to play in reducing this burden; for example, more-sustainable

food production can reduce water pollution and freshwater use and could sequester 9% to 23% of global annual GHG emissions in soils each year.¹³

The production changes needed are increasingly well understood but progress has been slow. At the heart of this problem are the many barriers – particularly the economic risks – that individual farmers face in adopting more sustainable production practices, technologies and inputs. Addressing the economic barriers requires filling a massive financing gap (Figure 1) and changing how capital is deployed.

FIGURE 1 More investment is needed to accelerate progress on climate, water and nature goals

Food and water systems receive much less investment than they need or deserve



The agriculture, forestry and other land use sector (a subset of the food system) **receives less than 4% of overall climate finance**

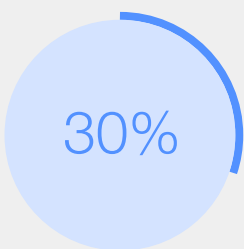


Global climate **investment in food systems must increase** by 15x, from ~\$20 billion to ~\$300-\$350 billion per year, to meet the expected annual costs of transformation over the next decade

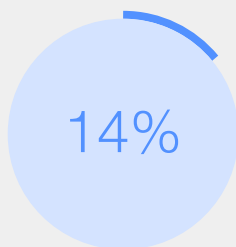


Reaching the full potential (agronomically optimal) adoption of just two regenerative practices (low/no-till and cover crops) in the US requires \$25-\$80 billion in financing

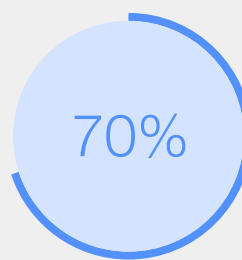
Food and agriculture account for a significant share of human impacts on climate, water and nature



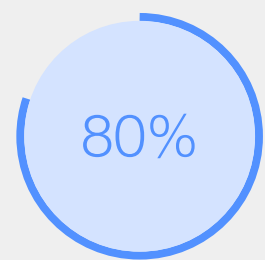
of global greenhouse gas (GHG) emissions are driven by food and agriculture



of global GHG emissions come from within the farm gate, generated by crop and livestock production activities



of global freshwater withdrawals are for agriculture*



of global deforestation and biodiversity loss is a result of agricultural production

*90% in low-income countries

Sources: Climate Policy Initiative,¹⁴ International Food Policy Research Institute,¹⁵ World Bank,¹⁶ Food and Agriculture Organization of the United Nations,¹⁷ Greenpeace,¹⁸ and World Economic Forum and Bain & Company analysis.



Healthy soil is the pathway to more sustainable, resilient and healthier food systems. We must work together to provide farmers with the technology, financing and support they need to adopt regenerative practices more quickly.

Svein Tore Holsether, President and Chief Executive Officer, Yara International

The adoption of regenerative agriculture (a context-dependent system of farming practices that delivers or improves ecosystem services and economic outcomes on the basis of better soil health; see definition in Figure 2) for row crop production is an important part of the broader transition to sustainable agricultural production across all crops and livestock and shares the same challenges. Like the broader food system transition, changes in farming practice are occurring, but not quickly enough, and significantly more investment is needed.

As an example, consider the efforts to drive the adoption of regenerative agriculture in the US, which is one of the largest and most productive growers of corn, soy and wheat in the world.¹⁹ In the US alone, private sector actors lead at least 50 active or planned efforts to support farmer adoption. Even so, less than 10% of US farmers were engaged in company-led regenerative agriculture pilots in 2021 and the adoption of regenerative practices remains far below full potential.²⁰ Take, for instance, two practices that have received attention recently: in the most recent official US data, farmers implemented no-till (in which soil is left undisturbed) on 36% and 39% of planted corn and soybean acres,²¹ respectively, and planted cover crops on just 7% of Midwestern farmland.²² Many other practices also remain below the agronomically optimal level of adoption and there is unmet demand from farmers for support; for example, a new farmer finance programme launched

by the Environmental Defense Fund and Farmers Business Network in 2022 to support the adoption of regenerative practices was quickly oversubscribed and will double in size in its second year.²³

A step-change in financing is needed. In the US, an estimated \$25 billion to \$80 billion or more in financing is needed to support farmers to reach the agronomically optimal level of adoption of just two practices – no-till farming and cover crops. The US represented some 10% of all grain and oilseed harvested acres globally in the 2021/2022 growing season,²⁴ so the investment necessary for global adoption to reach an optimal level – and the associated returns – are likely significantly higher. The Nature Conservancy estimates that increasing the adoption of a system of soil health practices comprising conservation tillage, cover cropping and increased crop rotations on just 1% of US corn, soy and wheat acres could result in \$226 million in annual societal economic benefits related to water savings, erosion, nutrient runoff and GHG emissions; its adoption on 50% of acres could realize benefits of over \$7 billion per year.²⁵

By understanding and tackling the challenges preventing faster adoption of regenerative farming practices, this report aims to provide a blueprint for how similar challenges can be overcome in the broader transition to greater sustainability across all agriculture.

“ Changes in farming practice are occurring, but not quickly enough, and significantly more investment is needed.

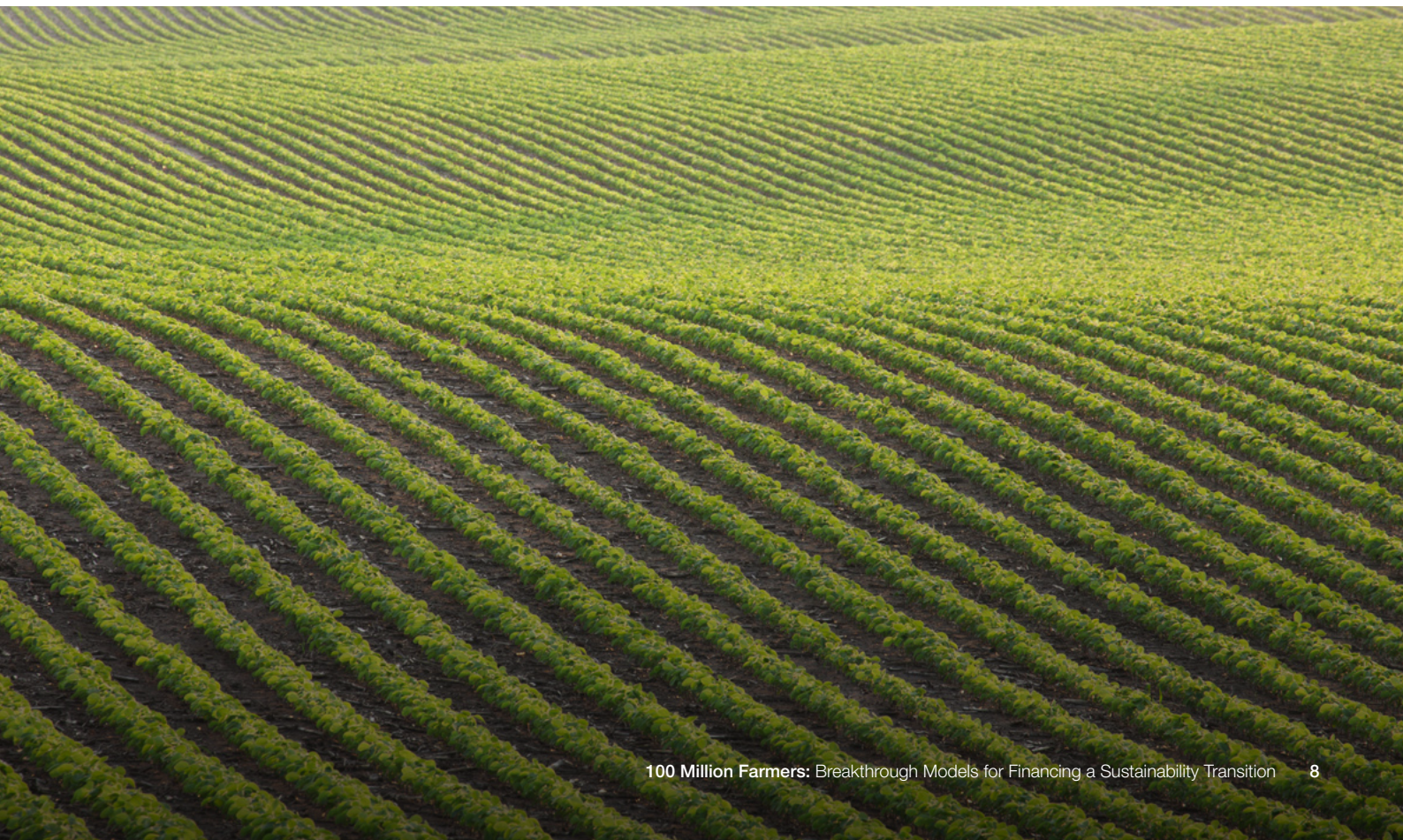
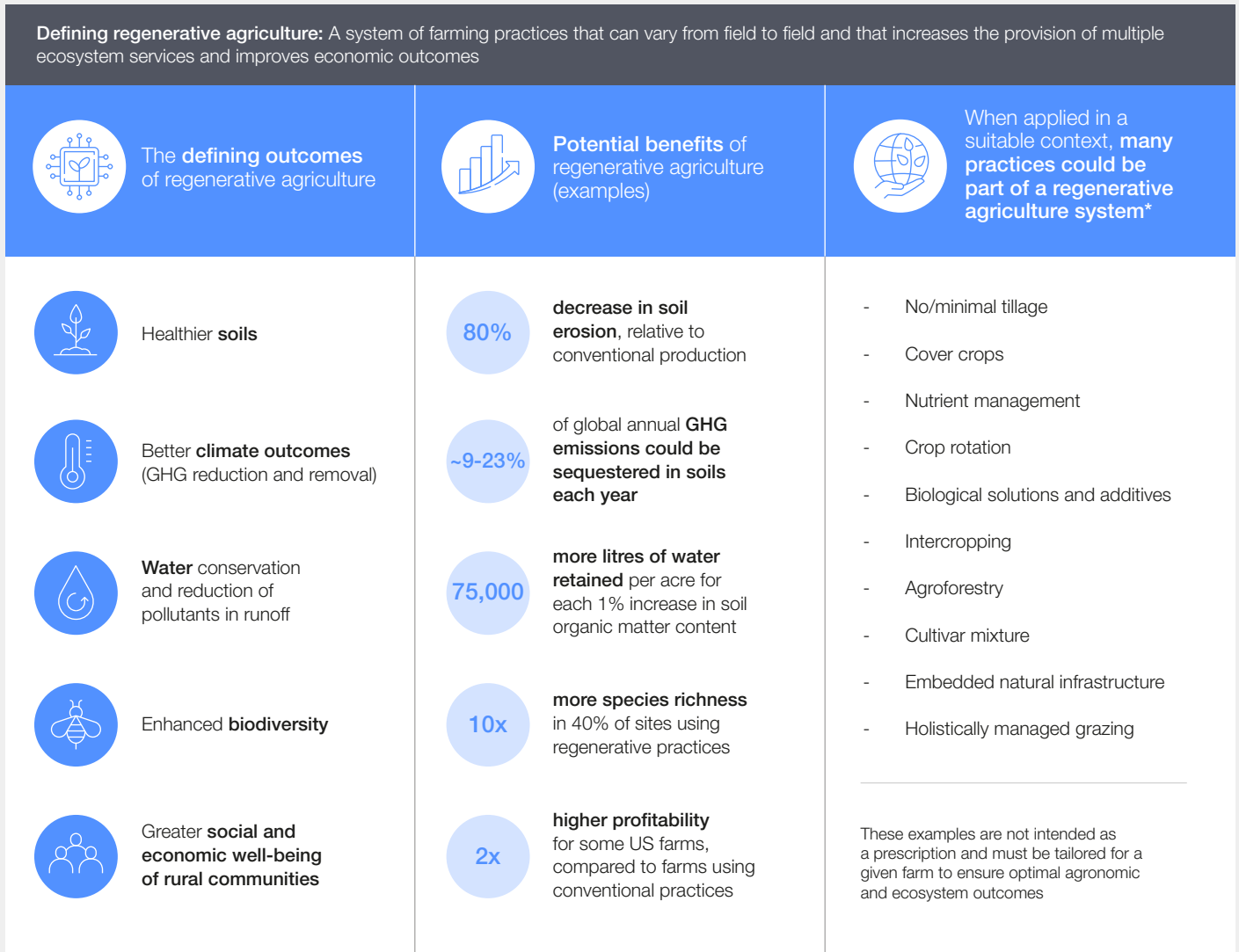


FIGURE 2 | A view on regenerative agriculture



*More research is needed to reduce the uncertainty about the impact of adopting each practice on specific outcomes, even in North America where the most research has been done so far.

Sources: Du et al. 2022,²⁶ Food and Agriculture Organization of the United Nations,²⁷ Natural Resources Defense Council,²⁸ Varah et al. 2020,²⁹ LaCanne et al. 2018.³⁰

For food systems broadly and regenerative agriculture in particular, additional capital investment alone will not be enough to accelerate progress; capital and capabilities must be coordinated and deployed more effectively. Understanding the barriers to adoption of regenerative practices that farmers face can help shed light on the specific financing and collaboration challenges that must

be overcome. The following examples and analysis are drawn primarily from developed markets where there has been greater momentum in financing innovation related to regenerative agriculture, although the report's key conclusions apply to a wide range of agricultural contexts. Chapter 2 includes a discussion of how some of the report's conclusions apply in developing markets.



Building a better future requires a level playing field for all actors and an enabling regulatory framework where positive outcomes would be rewarded. We need regulations that encourage investments in healthy soils and climate-friendly diets while keeping an eye on emissions and other impacts. We need to strike the right balance between the benefits and environmental impacts for the agri-food sector's sustainability transition.




Stefaan Decraene, Chair of the Managing Board, Rabobank

1.2 Barriers to faster adoption by farmers

Adopting regenerative agriculture may require farmers to make significant changes to how they farm, incorporating new inputs, equipment, services and techniques that could complement or

replace tried and tested methods that farmers may have followed for decades. Three types of barriers prevent faster adoption of regenerative agriculture: economic, technical and social (Figure 3).

FIGURE 3 Barriers to farmer adoption of regenerative agriculture

 <p>Economic barriers</p>	<p>Affordability Adoption may require investments and/or result in temporary losses for growers</p> <p>Timing of value Investments and cash losses occur in the near term, benefits are commonly not realized until later</p> <p>Risk and uncertainty Unpredictability of costs and, particularly, benefits of adoption</p>
 <p>Technical and operational barriers</p>	<p>Access Lack of access to needed agronomic advice, training, services, inputs, equipment, labour and/or market infrastructure</p> <p>Farm data and metrics Lack of clarity over what to measure and optimize for and how to measure or track progress</p> <p>Autonomy Programmes and regulations allow too little flexibility for growers to choose the most relevant practices and support</p>
 <p>Social barriers</p>	<p>Trust Lack of farming community trust in programmes that require major changes to how they farm</p> <p>Social dynamics Hesitation over unconventional practices and fragile leasing relationships between landowners and renter-operators</p>

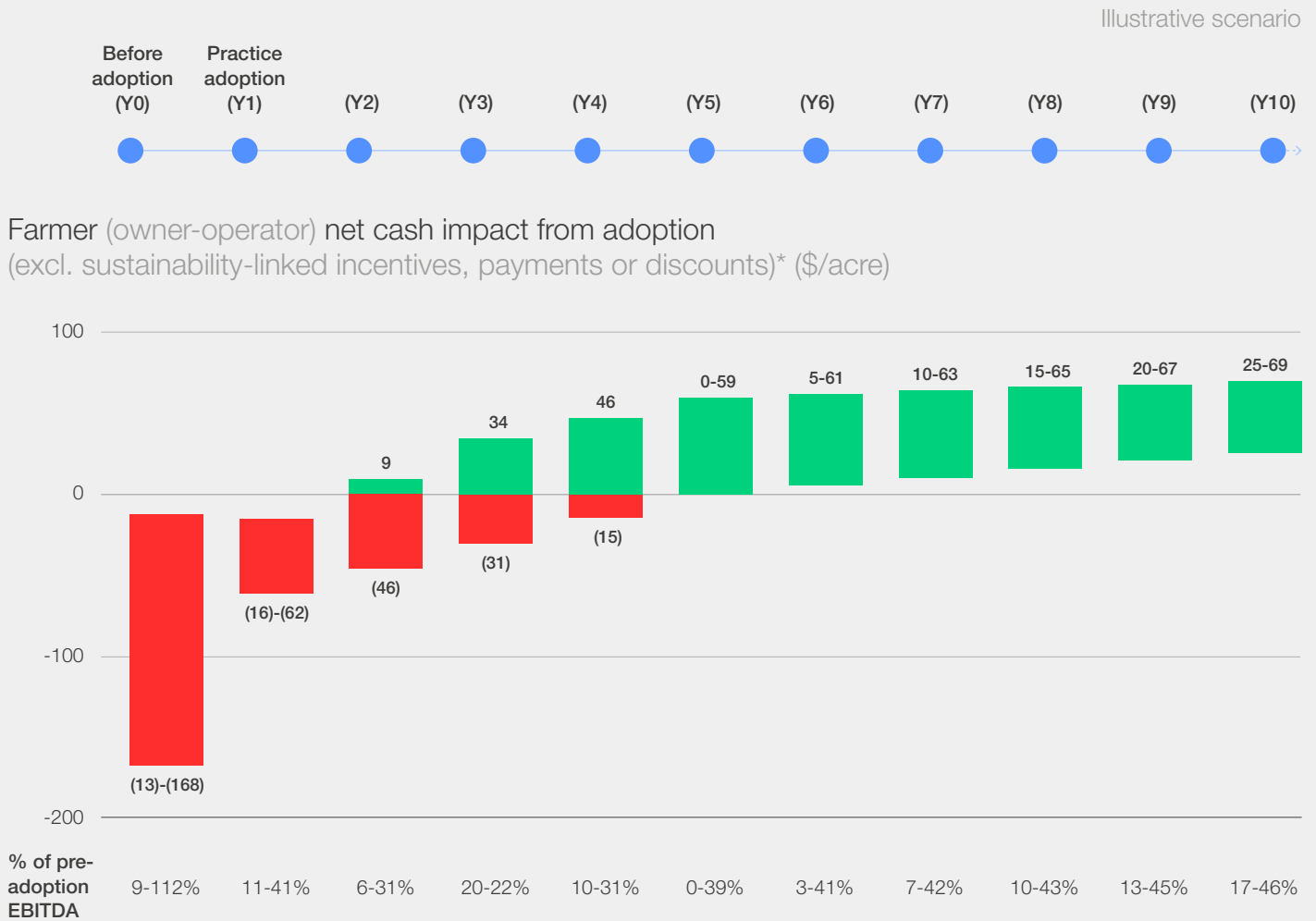
Farmers expect practices that deliver better soil health (a defining outcome of regenerative agriculture) to increase farm profitability in the long term, often due to higher yields or per-acre cost savings (e.g. reduced use of inputs and equipment).^{31, 32} However, to reap these rewards, farmers often must endure near-term decreases in cash flow and profitability due to the need to make upfront capital expenditures or pay higher per-acre costs (e.g. for additional seeds to plant cover crops). They may also experience temporary declines in yields as soils adjust to new practices and farmers move down the learning curve.^{33, 34, 35}

Many farmers simply lack the resources to work through these economic barriers and realize the long-term benefits of regenerative agriculture.³⁶ “There isn’t much of an immediate financial gain to be had and there are higher costs incurred,” one US farmer has noted. “Over time, the benefits of improved soil health will offset [those costs] but there’s a gap to plug.”³⁷

Surveys of farmers convey the same sentiment.³⁸ These challenges are exacerbated for farmers with shorter-term horizons – such as renters (a majority of US grain and oilseed farmers)³⁹ or farmers nearing retirement – who have even less reason to endure near-term losses to obtain long-term gains.

To illustrate the uncertain time lag between costs and benefits, Figure 4 shows the cash impact of adopting some regenerative practices on a 500-acre farm in the US state of Illinois that plants corn and soy in rotation. Introducing just two regenerative farming techniques – no-till farming and cover crops – could reduce cash flows for as many as four years after adoption but may increase cash flows from as early as the second year. This farm scenario serves as a helpful demonstration of the economic barriers to adoption that farmers face but it is just one example. The specific practices farmers adopt and the resulting outcomes will depend on various factors, including crop, climate and soil attributes.

FIGURE 4 Adoption typically increases farmer cash flows – but not for several years – and the impact can be difficult to predict precisely



*Cash impact from adoption is not adjusted for inflation and does not reflect non-cash costs, cover crop sales, grazing (hay savings), additional yield benefits in drought years, sustainability-linked incentives, payments, discounts, or proceeds from the sale of credits for carbon or other ecosystem services. The net cash impact of adoption is calculated relative to a baseline scenario in which crop prices are held fixed throughout the transition period at their Year 0 level.

“Economic, technical and social barriers must all be addressed for regenerative agriculture to reach its full potential but data show that economic barriers matter most.”

The second set of barriers are technical and operational. Farmers may lack access to the agronomic advice and training, services, inputs, equipment or market infrastructure required for the transition. There is not enough independent, third-party technical assistance to help farmers understand which practices would be advantageous to implement in each of their fields, how to implement them, and how to measure and track progress. In the US, more than half of farmers reported in 2021 that they had never been approached about or did not know how to get involved in regenerative agriculture programmes.⁴⁰ Many existing pilot programmes give farmers too little flexibility or offer a choice of regenerative practices that is too narrow, resulting in suboptimal outcomes.

The third set of barriers is social. Farmers may decline support from untrusted organizations or be hesitant or unable to share the sensitive, detailed operational data that programmes require. Some farmers may expect that replacing familiar practices with techniques perceived as unconventional would

be met with disapproval from their landowners or community members.

All these barriers must be addressed for regenerative agriculture to reach its full potential but farmers indicate that economic barriers are most important. In a survey of over 500 US farmers in 2022, more than 90% cited uncertainty over the return on investment as a barrier to adopting new conservation and regenerative practices.⁴¹ Conversely, new practices are much more widely adopted when economic concerns are addressed.⁴² For example, in a survey of US farmers covering the 2019 growing season, 31% of surveyed farmers indicated that they perceived 4R nutrient stewardship (right source, right rate, right time, right place)⁴³ use as “economically beneficial” or “economically and environmentally beneficial”.⁴⁴ Unsurprisingly, only 34% of the farmers surveyed used the practice on at least some of their applicable acres.⁴⁵ Meanwhile, 60% of farmers perceived 100% no-till as at least “economically beneficial” and 67% used the practice on at least some applicable acres.⁴⁶



1.3 The financing and collaboration challenges

The financing mechanisms and programmes available to support farmer adoption do not go far enough to fully address the barriers at scale. In particular, they do not bring forward the future value of multiple years of expected ecosystem services to provide farmers with payments or guarantees during the early years of adoption, one of the key financial innovations that would reduce the risk of adopting or expanding regenerative agriculture practices for farmers. These upfront payments or guarantees are rarely offered today. Even where they exist, they are usually not large enough to fully address the economic barriers farmers face.

Furthermore, insufficient capital enters food systems across geographies and commodities to fully support the scale and scope of change that is needed. As noted earlier, in 2021 and 2022, less than 4% of climate finance went to agriculture, forestry and other land use activities.⁴⁷ Not enough capital is flowing into the transition of row crops across developed markets because the complete set of ecosystem services delivered by regenerative agriculture – for example, improved resilience, carbon sequestration or reduced freshwater use and pollution – is not being monetized at full value and because the aggregation and coordination of capital – public and private, within and outside the value chain – is not happening to the degree necessary.

Across all ecosystem services, only the monetization of carbon outcomes (in the form of carbon offsets and insets and via emissions trading platforms) is relatively developed. The markets or mechanisms to allow ecosystem services other than carbon emissions avoidance or sequestration outcomes to be widely monetized do not yet exist. Improvements in water quality in nearby watersheds, water conservation and farmland resilience are rarely monetized. Other benefits, such as enhanced biodiversity or improvements in the nutrient density of food, are

even further behind. Institutions that could provide capital to support the transition, and actors across the system more broadly, lack sufficiently detailed data showing that adopting regenerative practices enhances environmental outcomes, increases resilience and improves economic outcomes for farmers. Furthermore, data availability, quality and standardization are often insufficient to know the current baseline, compare farms and evaluate progress. As a result, the business case for financing regenerative agriculture is often hard to prove.

Today, many actors – public and private, inside and outside the crop value chain – pay nothing for the benefits they capture from regenerative agriculture. For example, reduced nutrient runoff could improve local water quality and reduce costs for water authorities, although those authorities often do not contribute to local regenerative agriculture programmes. Unless many more actors that benefit from regenerative agriculture return some of the value they capture with farmer support programmes, those programmes will be unable to aggregate sufficient capital to provide the support farmers need.

In addition to the aggregation challenge, capital is insufficiently coordinated, meaning significant system efficiencies in risk management and overall costs are not realized. Pooling transition risk across many farms can create a portfolio with the same long-run positive return from adopting regenerative agriculture as the average individual farmer would expect but with less risk (Figure 5). Pooling risk across farmers could reduce the amount of capital required to increase adoption and capture the potential benefits. These gains in system efficiency are not fully realized because much-needed financial capabilities to assess, pool, price and manage risk, aggregate capital, monetize ecosystem services and re-engineer farmer cash flows are not sufficiently developed.

“ The transition is underfunded because ecosystem services (e.g. climate, water, resilience) are not all monetized at full value and capital is not coordinated well enough.

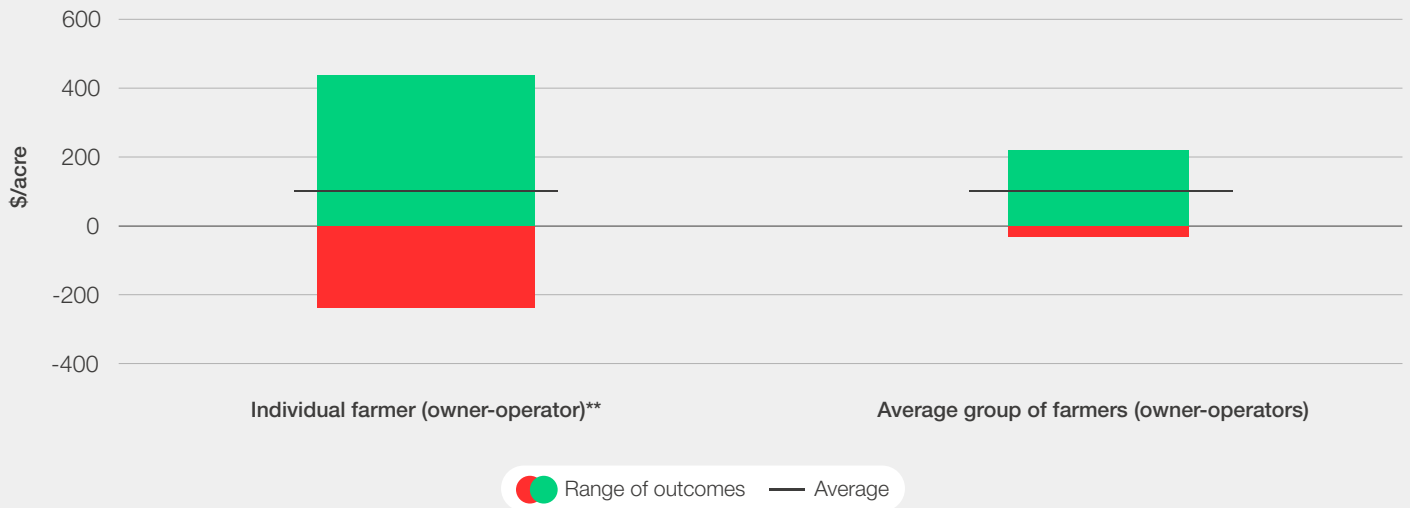
Illustrative scenario

Economic outcomes of adopting regenerative practices can vary widely for individual farmers

When risk is pooled across farms, a programme can have a much narrower range of economic outcomes

Cumulative net cash impact from adoption,* years 0-10

Cumulative net cash impact from adoption,* years 0-10



*Cash impact from adoption is not adjusted for inflation and does not reflect non-cash costs, cover crop sales, grazing (hay savings), additional yield benefits in drought years, sustainability-linked incentives, payments, discounts, or proceeds from the sale of credits for carbon or other ecosystem services.

**Individual farmer cumulative net cash impact reflects the cumulative range of potential cash flow impacts illustrated in Figure 4, from pre-adoption through 10 years post-adoption (Y0-Y10). This illustration assumes that the cash impact of adoption is not perfectly correlated among farmers within a group.

Only 15% of the over 50 regenerative agriculture pilot programmes in the US that were studied for this report include a financial institution of any size, yet agricultural financial services providers stand to gain from regenerative agriculture. These financial services providers are facing increasing risks from climate change and nature loss. In fact, 87% of respondents to a 2022 survey of financial institutions worldwide indicated that they expect climate change to pose a material risk to their business; yet only 24% have integrated climate considerations to their business in a significant way.⁴⁸ The adoption of regenerative agriculture could help reduce physical risks for financial institutions by improving soil health, which in turn reduces the likelihood of crop losses (and associated insurance pay-outs) from

flooding, drought and pests.⁴⁹ Higher and more certain yields increase the value of agricultural land, which benefits financial institutions and landowners. Regenerative agriculture could also help financial institutions comply with potential future regulations – for example, a requirement that banks maintain a sufficient green asset ratio.

Finally, current models don't always address the technical and economic barriers in a coordinated and integrated way that provides farmers with accessible, flexible, easy-to-use and trusted solutions. The next chapter proposes a breakthrough model for financing and collaboration that addresses the barriers to adoption farmers face and unlocks sustainable long-term value for all the actors involved.



Farmers have been embracing climate-smart agricultural practices and food production for decades but now it's time for business leaders and policy-makers to get fully behind them. That means supporting coordinated initiatives that help the agri-food sector reduce emissions and finding more ways to financially reward farmers for what they preserve, not just what they produce.

Dave McKay, President and Chief Executive Officer, Royal Bank of Canada

2

Breakthrough models for financing and collaboration to support farmers

A coordinated system of actors can drive a step-change in sustainable food production by financing and delivering services for farmers that reduce their adoption risks.



2.1 An illustration of a breakthrough model for financing and collaboration

To overcome the economic, technical and social barriers standing in the way of the faster adoption of regenerative farming practices, breakthrough models of financing and collaboration need eight critical

design elements (Figure 6). These elements describe what support farmers need, how support should be funded and who needs to fund and deliver it.

FIGURE 6 Design elements for breakthrough models to support the adoption of regenerative agriculture

 <p>What support farmers need</p>	<p>1 The "farmer services stack": Provide a flexible set of financial and non-financial solutions, including technical assistance and measurement, reporting and verification (MRV) services, to address barriers to adoption; farmers should have the agency and flexibility to select the services most relevant to their specific context and needs.</p> <p>2 Lending and insurance on more favourable terms: As part of the farmer services stack, provide lending and insurance solutions and terms (e.g. lower rates and/or longer contracts) to farmers that reflect regenerative farms' improved resilience and reduced risk over time.</p> <p>3 Up-front payments or guarantees: As part of the farmer services stack, provide payments or guarantees in early years of adoption (based on the expected value of ecosystem services in later years) that are large enough to reduce or eliminate farmers' economic risks, with no expectation of repayment.</p>
 <p>How support should be funded</p>	<p>4 Full ecosystem services monetization: Fully quantify and monetize all the ecosystem services delivered by regenerative agriculture, including climate, water, biodiversity, resilience and nutrient density of food, with participation from all the actors who stand to benefit from these outcomes. This full monetization should generate most, or all, of the capital required to fund the farmer services stack.</p> <p>5 The "financing stack": Obtain additional public and/or private concessional, catalytic or long-term capital to (i) support programme set-up; (ii) fully cover the costs of providing all the services farmers need (particularly before full ecosystem services monetization is achieved).</p>
 <p>Who needs to fund and deliver support</p>	<p>6 Coordinating mechanism: An actor or actors must aggregate the value of full ecosystem services monetization across multiple actors, aggregate capital from multiple sources in the financing stack, and combine both to enable service delivery for farmers, compensate service providers, and provide a suitable return to investors (later in adoption).</p> <p>7 Full system participation: Deliver the farmer services stack through collaboration between many actors, including financial service providers, crop value chain participants, technical assistance and MRV providers, policy-makers and regulators. Ensure each actor has an attractive value proposition to drive their engagement. Actors with existing, trusted relationships with farmers are essential.</p> <p>8 Advanced financial capabilities: Ensure the actor or actors behind the coordinating mechanism can model expected ecosystem services and economic outcomes for a portfolio of farms, aggregate buyers to monetize ecosystem services, make or facilitate up-front payments or guarantees to farmers that re-engineer cash flow impact of adoption, and pool and manage risk across farms and partners.</p>

“ The farmer services stack should include upfront payments or guarantees that reduce the economic risk of adoption and reflect the expected value of future ecosystem services.

Figure 7 depicts a breakthrough model for financing and collaboration. Farmers (Figure 7 – A) need a flexible stack of services from financial and non-financial providers (Figure 7 – B and C) that address the barriers to adoption and ensure the transition endures. Two types of financial solutions are particularly critical:

- Lending and insurance on terms that are more favourable for regenerative farms (e.g. lower rates, longer contracts or discounted supplementary products such as crop warranties) to share the additional value that financial services actors can capture over time from greater resilience due to the adoption of regenerative practices; the terms available to farmers can become more favourable over time as the benefits to financial services actors materialize.
- Upfront payments or guarantees to farmers that reflect the expected value of future ecosystem services and are paid multiple years in advance to offset cash decreases that can occur in the early years of regenerative practice adoption.

The flexible set of services for farmers is called a “stack” because farmers will often require multiple services and those services must be compatible with one another (this is often a challenge today, see Chapter 2.3). To make all the elements of the farmer services stack available will require continued innovation and supportive action and investment from public and private actors (see Chapter 3) and needs will vary across geographies.

The farmer services stack can be financed with two sources of capital: ecosystem services monetization and investment from public and private capital providers.

The first of these – monetization of the full set of ecosystem services at their full value – should be the primary source of capital in the long run. Most of this value is realized on a recurring basis by selling claims on some of the external environmental outcomes to a range of buyers (Figure 7 – D); farmers that adopt regenerative practices can trade these claims for a finite period in exchange for the farmer services stack and a multitude of on-farm benefits, such as improved soil health, increased yields and better water retention. Financial services actors provide another mechanism for monetizing ecosystem services – specifically improved farm resilience – by sharing part of the value they capture over time. For financial services providers, this value results from the better financial health of farms and other clients whose businesses depend on farms, progress on the financial services firms’ own environmental commitments and regulatory obligations and cheaper access to capital.

The second source of capital – investment from capital providers – is needed to finance the initial programme set-up and pay for the support farmers receive before all ecosystem services are fully monetized. These investments – catalytic, concessional and long-term capital – should come from a range of investors (e.g. public and private philanthropic funds, impact investors, banks and others) with different return expectations and horizons (Figure 7 – E).



FIGURE 7 | A breakthrough model for financing and collaboration coordinates actors in and beyond the agri-food value chain to deliver the farmer stack and fully monetize ecosystem services



Several types of coordination are needed to help the actors identified so far (Figure 7 – A to E) aggregate and deploy capital effectively. First, farmers must be able to interact in a simple way with multiple service providers (financial and technical, such as measurement, reporting and verification (MRV) providers). Second, ecosystem services must be quantified, aggregated and marketed to a diverse mix of buyers to capture their full value. Third, capital must be pooled from multiple providers. The coordinating mechanism (Figure 7 – F) that facilitates these activities can be provided by one or more existing actors or by a new special purpose entity, as in some of the examples highlighted in Chapter 2.2.

Crucially, the actor or actors that provide the coordinating mechanism have a financial role

to play as well: they provide or facilitate upfront payments or guarantees to farmers to offset cash decreases that can occur in the early years of regenerative practice adoption and recoup this outlay later by selling environmental outcomes. This mechanism can provide financial support to farmers more simply and flexibly than many mechanisms that existing programmes use, such as discounts on inputs, payments for carbon or water credits and price premiums for sustainable crops. Price premiums can continue to reward farmers long after regenerative agriculture practices are first adopted and can be part of a farmer services stack to help maintain improvements in sustainability. However, price premiums cannot be the primary mechanism for providing financial support because farmers may need more support in the early years of their transitions than price premiums can provide (which are ultimately

“ All of the actors that stand to gain from regenerative agriculture should contribute capital to support adoption and ongoing improvements.

supported by the end-market and consumers) and because price premiums are less viable for crops (e.g. corn, soy) that often represent only a small proportion of the consumer-facing end-product or are used in end-products whose purchasers are unwilling to pay a premium (e.g. animal feed).

To provide upfront payments or guarantees requires advanced financial capabilities, as well as access to on-farm data and associated modelling expertise. The actor(s) providing or facilitating these payments or guarantees must accurately project the economic costs and benefits of practice adoption and the environmental outcomes produced over a multi-year period for each enrolled farmer. They need to have the capabilities to create a market for these environmental outcomes. And they need to forecast the risk of providing payments and guarantees before these environmental outcomes are realized for a portfolio of farmers and obtain financing to support those risks.

For this model to function effectively and provide an attractive value proposition to all participants, there is little room for free riders. Buyers of environmental outcomes should include all participants across the value chain – the downstream buyers of grains and oilseeds and their derivative food, fuel, feed and fibre products, as well as input providers, retailers, financial services providers and other actors that benefit from the improved provision of ecosystem services, such as water authorities. All of the actors that stand to gain from the implementation of regenerative agriculture logically should contribute capital to support each participating farm's

adoption and ongoing improvements. The same applies to landowners who can accrue equity through improved soil health over time and should contribute to the implementation of regenerative practices. The coordinating mechanism is critical in bringing everyone to the table.

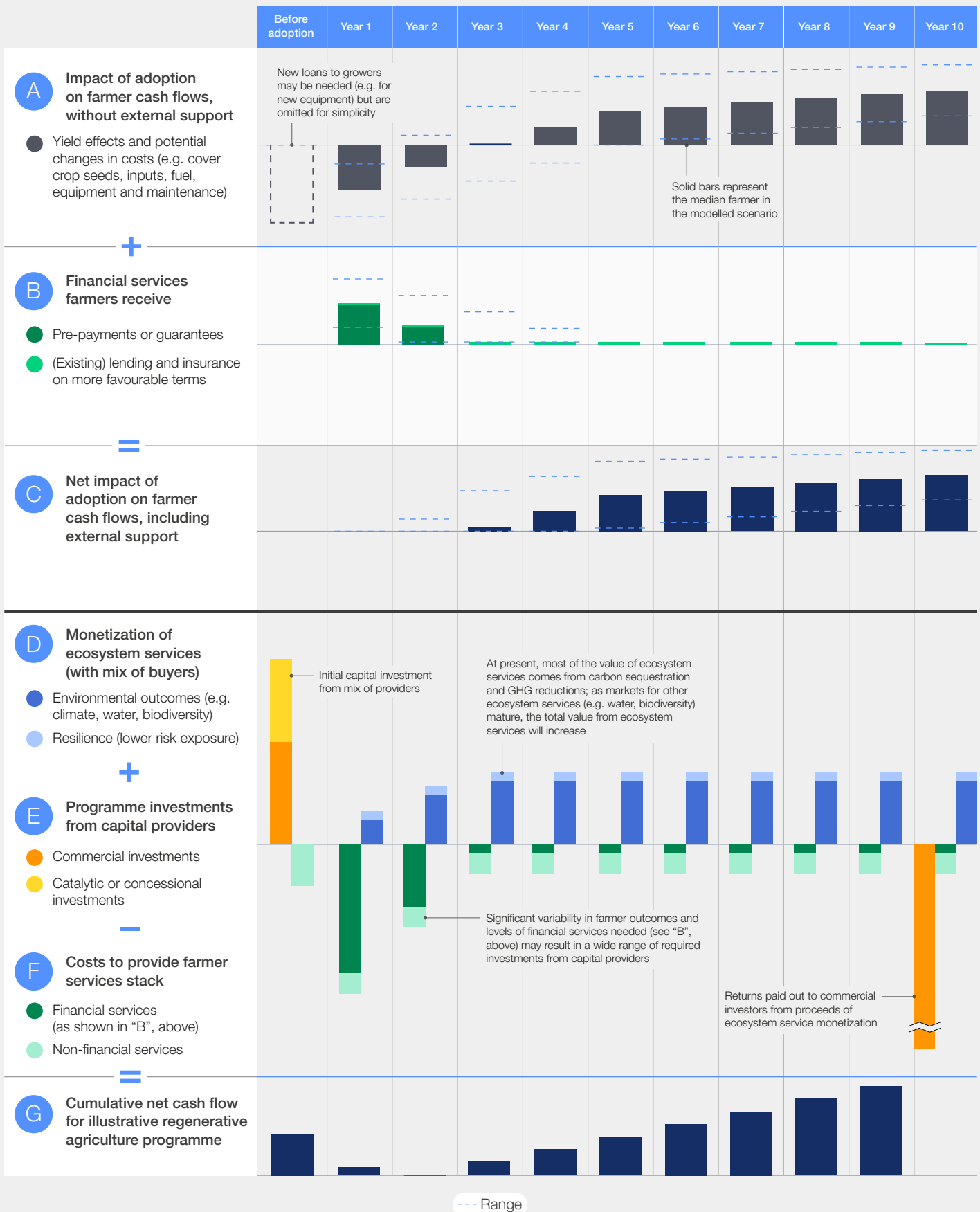
This model can be economically viable for all participants, which is an essential characteristic to attract broad participation. Figure 8 illustrates cash flows for a hypothetical US farmer owning a 500-acre farm in Illinois who grows corn and soybeans in rotation and adopts cover crops and no-till for the first time with no external financial support (part A). The analysis shows that financial support from the programme (part B) ensures the farmer is never worse off in any year, from a cash perspective, than they would have been if they had not transitioned to regenerative agriculture (part C).

The model also provides incentives to engage a wider set of participants. Figure 8 shows how a combination of ecosystem services monetization (part D) and a capital stack with a mix of commercial (i.e. return-earning) investments and catalytic or concessional investments (part E) can cover the costs to provide the stack of financial and non-financial services to farmers (part F) and generate a net-positive cash flow over the life of a 10-year programme (part G). In the scenario illustrated in Figure 8, each dollar of catalytic capital (invested prior to adoption) unlocks at least eight dollars of return-earning capital from commercial investors and ecosystem services monetization over the 10-year period.



FIGURE 8 | Ecosystem services monetization and capital investment can cover the cost of financial support for farmers to offset cash decreases in the early years of adoption

Illustrative scenario



Note: Figure illustrates the case in which the initiative can exactly offset negative farmer outcomes in the early years of adoption. Some farmers may need loans to afford upfront capital investments; cash flows related to new loans are omitted to simplify this visual. In the modelled scenario, a 500-acre farm in Illinois, USA, growing corn and soy in rotation transitions from conventional practices to no-till and cover crops. In the scenario, only commercial investments (~55% of total investments) are repaid.

2.2 Innovative existing programmes

Existing programmes show how the elements of breakthrough models for financing and collaboration can be put into place and help identify critical elements that are often still missing. Of the more than 50 existing programmes documented as part of the research for this report, the following pages highlight seven examples chosen because they clearly illustrate the design elements and have demonstrated strong initial traction. They also vary in their set-ups, have innovated in different ways, operate in several geographies and were catalysed by different types of actors: grower associations, financial services providers and agricultural-technology (agtech) companies. The following descriptions do not necessarily include every design element for each initiative.

“ SWOF performs the role of a coordinating mechanism, creating a market for environmental outcomes and selling the outcomes from a single field to multiple buyers.

Grower association-linked initiatives

Grower associations often have pre-existing trusted relationships with the farmers in the local communities they serve, which provide a strong foundation for programme coordinators who need to deeply understand farmers’ needs and concerns, offer advice and assistance on optimal methods of farming and collect potentially sensitive farm data to quantify ecosystem services and economic outcomes.

Regenerative agriculture support programmes are more effective when they facilitate farmer-to-farmer knowledge sharing, a spirit of curiosity about innovation and a culture of continuous improvement – which grower associations are well-placed to do.

The Soil and Water Outcomes Fund (SWOF)

is a US-based programme affiliated with the Iowa Soybean Association with more than 250,000 acres⁵⁰ expected to be enrolled in 19 states in 2023 (Figure 9).⁵¹ SWOF exhibits many elements of a breakthrough model of financing and collaboration: a services stack that includes non-financial services and payments, some of which are made upfront; the monetization of multiple ecosystem services; and private and catalytic public funding, including from the United States Department of Agriculture (USDA) Partnerships for Climate-Smart Commodities programme. Critically, SWOF performs the role of a coordinating mechanism, creating a market for environmental outcomes and selling the outcomes from a single field to multiple buyers.⁵² Enrolled acreage in SWOF has grown more than 25 times⁵³ since the pilot crop in 2020,⁵⁴ and 92% of participating farmers indicated they were “likely or extremely likely to recommend SWOF to a fellow farmer” in 2022.⁵⁵



FIGURE 9 | The Soil and Water Outcomes Fund Spotlight



Distinctive design elements of SWOF

<p>What support farmers need</p>	<p>Farmers can access a services stack, including payments, technical assistance and MRV support</p> <p>Financial support for farmers includes upfront payments equal to half of the expected value of in-year climate and water outcomes</p> <p>Provides flexibility to farmers by offering one-year contracts and support for several regenerative agriculture practices</p>
<p>How support should be funded</p>	<p>Monetizes multiple environmental outcomes (carbon sequestration and avoidance, nitrous oxide mitigation, and water quality) with varied buyers (e.g. PepsiCo, Cargill, Nutrien, city of Cedar Rapids)</p> <p>Obtained multiple sources of public and private investment from the USDA, state of Iowa and philanthropic grants</p>
<p>Who needs to fund and deliver support</p>	<p>Serves as a coordinating mechanism, creating a market for environmental outcomes by aggregating and matching farmers, companies and government agencies</p> <p>Sells the environmental outcomes from a single field to several actors that benefit, increasing value for farmers</p>

Source: Soil and Water Outcomes Fund^{56, 57, 58, 59, 60, 61}

Precision Conservation Management (PCM), a US-based programme affiliated with the Illinois Corn Growers Association and Illinois Soybean Association and supported by global food and beverage leader PepsiCo, is piloting an incentive programme that reached some 200,000 acres in Illinois in 2022.⁶² Through this programme, farmers can receive technical assistance and have a choice of two financial mechanisms, financed by PepsiCo, in exchange for the carbon assets: a practice-based incentive programme or a sustainability-linked crop insurance subsidy, which enables farmers that adopt a regenerative practice to take out insurance against potential yield loss at no cost.⁶³ PCM makes connections to financial resources that help farmers adopt regenerative practices and provides farmers

with financial and sustainability benchmarks in an annual report, which makes the economic and environmental costs and benefits of management decisions more transparent. It publishes an aggregated summary from the dataset annually that allows non-participants to benefit from the knowledge of their most profitable peers. An Illinois farmer testimonial shared at a meeting hosted by PCM stated that PCM data “is probably more of my motivation [for making a change] than anything else.” In addition to financing from PepsiCo, PCM’s financing stack includes public and philanthropic catalytic funding from the Walton Family Foundation and various USDA Natural Resources Conservation Service (NRCS) grants.⁶⁴

The PCM programme shares several important similarities with SWOF: both programmes provide financial and technical support (including upfront payments or guarantees that reduce risk for the farmers), monetize multiple environmental outcomes (including climate and water outcomes, though only SWOF allows different types of environmental outcomes produced by a single field to be claimed by different buyers) and blend financing from private and public sources.

Financial service providers (and partners)

Financial services providers underpin the second set of examples. A lack of data, regulatory hurdles and capability gaps can make it difficult for financial services providers to invest in programmes that support the adoption of regenerative agriculture. Still, three providers are finding a way based on confidence that farm resilience will benefit financial service actors in the long run.

National Australia Bank (NAB) is one of the largest financial services providers in Australia and has a significant focus on the food and agriculture sectors.⁶⁵ Recognizing that regenerative agriculture is likely to reduce the risk in its portfolio, NAB offers loans on more favourable terms to farmers that adopt regenerative practices (e.g. Agri Green Loans programme) and thereby enables farmers to benefit financially from improved resilience.⁶⁶ To further develop loan products that reflect farm sustainability, NAB is investing in new data capabilities to quantify the benefits of regenerative practice adoption for farmers and lenders and enable credit policies and processes to reflect regenerative activities.⁶⁷

Rabobank is a global financial services provider with a focus on agriculture and food, which accounts for about a quarter of the bank's credit exposure.⁶⁸ Rabobank also recognizes that regenerative practice adoption can lead to better economic outcomes for both farmers and lenders and offers several financial services to help support adoption,⁶⁹ including equipment financing and working capital facilities on more favourable terms and payments for carbon outcomes through Rabo Carbon Bank, a platform for aggregating and selling carbon outcomes in which the bank performs the role of coordinating mechanism.⁷⁰ Rabobank is investing in new capabilities to offer these services, including the development of data capabilities (e.g. to better measure the performance of farms on various sustainability criteria) and an agriculture

centre of excellence.⁷¹ To finance and deliver support to farmers, Rabobank works with MRV providers (e.g. Continuum Ag) and environmental outcomes buyers, including agri-food companies.⁷²

Crédit Agricole was founded to support the agriculture sector in France and has €46 billion of outstanding credit to the agriculture and food processing sectors today.⁷³ Crédit Agricole enables farmers to benefit financially from regenerative agriculture adoption in several ways. First, through a partnership with Canadian multinational McCain Foods, Crédit Agricole is offering up to €40 million of new debt on attractive terms to some 800 potato farmers to support their adoption of regenerative practices.⁷⁴ With McCain making the interest payments, Crédit Agricole providing the loans and both benefiting from regenerative practice adoption, the partnership is an example of the way that aggregating capital from actors within and beyond food value chains can unlock value that actors could not capture by acting alone. Additionally, Crédit Agricole is planning to launch a platform to monetize agricultural carbon outcomes in partnership with France Carbon Agri in 2024, providing a coordinating mechanism to aggregate and deploy capital.⁷⁵ Crédit Agricole is developing new capabilities alongside its new products; for example, the bank's Trajectories RSE Agri tool will help relationship managers have more targeted discussions about regenerative agriculture with farmers.⁷⁶

Agtech companies

In the final pair of examples, agtech companies provide a compelling value proposition for farmers by coordinating an extensive network of partners with diverse capabilities and interests. In particular, advanced financial capabilities, such as sophisticated models to predict the effect of regenerative practice adoption on ecosystem services provision and economic outcomes, make it possible to offer innovative financial mechanisms to farmers that increase flexibility and reduce risk.

Indigo offers several programmes for farmers adopting regenerative practices. Some 2,000 farmers have enrolled 6 million acres⁷⁷ in its industry-leading carbon monetization programme since it began in 2019.⁷⁸ **Growers Edge** offers sustainable warranty-backed crop plans to drive the adoption of cover crops and nutrient management. These crop plans will be available in more than 20 states for 2024, the third year of the offering, and are forecast to impact over 350,000 acres.⁷⁹

FIGURE 10 | Elements of breakthrough financing and collaboration models in programmes catalysed by agtech companies

	Indigo (USA)	Growers Edge (USA)
What support farmers get	<p>A services stack, including payments, technical assistance and MRV support, delivered by Indigo and its partner ecosystem</p> <p>A choice of financial mechanisms – payment for environmental outcomes, premium prices for regeneratively produced crops and mortgage interest rate rebates – which provide flexibility</p>	<p>A services stack (financed and delivered in collaboration with partners) that includes technical assistance and financial support</p> <p>Primary financial offering uses a warranty – an upfront guarantee of a fixed, per-acre payment to farmers if regenerative practice adoption results in yield loss (relative to historical production)</p> <p>Warranty enables financing for inputs that may include more-favourable terms and multi-year commitments</p>
How support is funded	<p>Monetization of multiple ecosystem services (e.g. carbon sequestration, improved resilience and reduced water use)</p> <p>Financing comes from Indigo and investors, private sector companies (outcome payments and premiums) and lenders (rebates)</p>	<p>Venture-capital backed, with additional funding from NGOs, private partners and USDA (via Partnerships for Climate-Smart Commodities programme)</p>
Who funds and delivers support	<p>Serves as a coordinating mechanism, creating a market for environmental outcomes by aggregating and matching farmers and companies, including capacity building among potential credit buyers where needed</p> <p>Advanced financial capabilities (e.g. models to estimate the impact of regen practices on multiple outcomes) enable financial services for farmers, including up-front payments, minimum payments and mortgage rebates that pool risk across farms</p>	<p>Coordinates an extensive group of participants, including venture capital providers, ag retailers, The Nature Conservancy and other NGOs, and Munich Re (provides actuarial validation and reinsurance), that collectively possesses the right resources and capabilities to deliver the stack of services to farmers</p> <p>Advanced data analytics and financial capabilities (e.g. setting historical baseline and actuarial estimates of practice impacts) enable the provision of warranty product</p>

Source: Indigo,⁸⁰ Growers Edge,^{81, 82, 83} Field to Market⁸⁴

2.3 Gaps in existing programmes

The previous section highlights some of the most promising existing programmes. However, much work is still needed to scale these up and to apply the lessons to other pilots and initiatives. Existing programmes do not include all the necessary elements of breakthrough models for financing and collaboration:

- No existing programme provides the full stack of services: financial services (including lending and insurance on more favourable terms and adequate upfront payments or guarantees) to defray the risk of adoption for farmers and technical services (for example MRV capabilities to credibly quantify and verify the outcomes).
- Existing initiatives do not monetize or capture the full value of the full set of ecosystem services delivered by regenerative agriculture, nor do they coordinate payments for those ecosystem services from the full set of actors that stand to benefit.
- Existing initiatives are not set up to aggregate and manage the public and private catalytic, concessional and long-term investment required to adequately support farmers in the early years of their transitions and ensure the change is long-lasting.
- Few initiatives mobilize all the actors necessary to deliver the full set of services farmers need; in particular, financial services actors are not engaged enough in existing initiatives.
- Programmes require more advanced financial capabilities and more data to underpin the financing and collaboration required.



BOX 1 | Applying breakthrough models for financing and collaboration to developing markets

There is a \$300 billion annual financing gap in the agri-food systems of developing countries⁸⁵ that needs to be met to accelerate progress on the United Nations Sustainable Development Goals and increase resilience to global shocks. It is beyond the scope of this report to fully address the application of breakthrough models for financing and collaboration to advance climate-smart, nature-positive agriculture in developing markets. However, at a high level, the fundamental elements of the model are still expected to apply. There is a need for a farmer services stack, including financial and non-financial services and support, that reduces the risks of adoption for farmers that arise when economic losses from adoption occur earlier or with greater certainty than economic benefits; these risks should be reduced by providing affordable financing and upfront payments or guarantees. In addition, developing markets arguably have an even greater need than developed markets for the aggregation and coordination of capital across public and private actors and blended financing. As in developed markets, coordinating mechanisms that can mobilize full engagement from broad sets of actors in the ecosystem are important and financial actors have a pivotal role to play.

Despite these common threads, the financing and collaboration model must also be adapted to account for differences between the agricultural contexts in developed and developing markets. In developing markets, the predominance of smallholder farms – typically no larger than two

hectares and characterized by relatively low productivity – creates even greater coordination challenges than in developed markets. Smallholder farmers can vary widely in skills, market connections and incomes, implying very different readiness to adopt new climate-smart inputs, practices or technologies. In many countries, formal markets are nascent and small and medium-sized enterprises (SMEs) dominate agri-food supply chains.⁸⁶ Financial ecosystems are also underdeveloped in developing markets and many farmers lack access to essential financial services. In particular, there is a huge gap in agricultural and climate risk insurance in rural areas of the developing world where protection is often needed most. Developing markets also have weaker enabling environments in terms of policy support, infrastructure development (including farm-level data capture and availability) and other public investments,⁸⁷ even as governments attempt to tackle broad development agendas with limited capital and resources.⁸⁸

Given these differences in context, elements of the financing and collaboration model will carry different weights or apply differently. To start with, the farmer services stack will need to target commercially oriented smallholder farmers who typically account for a disproportionate share of agricultural production, are more connected to formal markets and have greater ability to adopt new inputs, technologies and farming methods. As part of the stack, upfront payments or guarantees financed primarily through ecosystem services would likely

take longer to operationalize. As such, agri-food businesses can play a catalytic role in accelerating smallholder farmer adoption by providing volume commitments, pricing premiums, affordable inputs and equipment, as well as outcome-based payments for sustainably produced foods; as early environmental outcome purchasers, they can also help catalyse the monetization of ecosystem services and greater resilience (particularly for their own supply chains). Another key difference is the larger role that needs to be played by government ministries to build the right country enabling environment (e.g. priority sector lending, public investments including tax incentives and subsidies, building the data commons) and by international donors, development finance institutions and impact investors to provide concessional capital and blended mechanisms (e.g. credit guarantees, interest subsidies, first-loss vehicles and technical assistance facilities) to de-risk and unlock commercial lending and private sector investment. Finally, farmer-allied enterprises have the potential to act as linchpins for more resilient local food systems by aggregating – and building the capacity of – smallholder farmers, facilitating access to inputs, credit and markets, and encouraging the adoption of climate-smart practices and technologies. Mobilizing the right financial and non-financial services stack for successful small and medium-sized farmer-allied enterprises (e.g. farmer cooperatives, aggregators, processors and vertically integrated brands) could provide an efficient and effective way to support commercially-oriented smallholder farmers and accelerate their transition to more productive, sustainable and resilient agriculture.

Some of these services and financing mechanisms already exist in developing markets, even if they do not specifically focus on improving sustainability. For instance, Aceli Africa, backed by USAID and others,⁸⁹ is helping unlock commercial lending for agri-SMEs in sub-Saharan Africa by offering concessional financing to local lenders⁹⁰ through origination incentives, first-loss coverage and other capacity-building support.⁹¹ Since launching in 2020, Aceli has supported \$84 million in loans to agri-SMEs that purchase produce from 429,000 farmers.⁹²

Also launched in 2020, IDH's \$105 million Farmfit impact fund is a public-private coalition that encompasses major food companies such as Unilever and Mondelez, banks including Rabobank, and development agencies from the US, United Kingdom and others.⁹³ The fund aims to unlock commercial investment in smallholder farms by taking responsibility for the first losses

incurred. It includes a second-loss guarantee facility from USAID (of up to \$250 million),⁹⁴ which provides significant reassurance for investors. In addition to de-risking private capital, the fund provides non-financial support services⁹⁵ and collects data and learnings through Farmfit Intelligence.⁹⁶

The Upper Tana Nairobi Water Fund (UTNWF) in Kenya is a good example of a financing mechanism directly focused on helping farmers adopt conservation practices. It was set up in 2015 by the International Fund for Agricultural Development (IFAD), Global Environmental Facility (GEF), The Nature Conservancy and other partners.⁹⁷ The UTNWF received more than \$25 million in blended financing from the private sector, philanthropic donors, development financial institutions and government agencies.⁹⁸ The fund mobilizes a broad set of actors to provide farmers in the Upper Tana region with technical support and incentives to adopt conservation practices – such as permanent grass buffers along streams or agroforestry – that result in better water quality, more reliable water supply and reduced water treatment costs for companies and government agencies downstream in Nairobi.⁹⁹ As of 2021, the programme had reached nearly 190,000 farmers and had resulted in an average increase in crop productivity of 50%, restored 115,300 hectares, mitigated 1.3 million tonnes of CO₂-equivalent, increased the average flow of water to Nairobi by 45%, and reduced the volume of chemicals by 13%.¹⁰⁰

These examples hold promise but much more work must be done to implement and scale up breakthrough models for financing and collaboration to unlock the considerable financing required in developing markets. Innovations that maximize the efficiency of capital deployment to smallholder farmers and improve the affordability of new technologies – digital financial services, embedded lending (pay-as-you-go) and insurance offerings, and farming-as-a-service models, among others – should similarly be scaled up. There is an opportunity to accelerate the monetization of emissions avoidance and sequestration, resilience and other ecosystem services by developing the right programmes and connecting to developed credit markets.¹⁰¹ Importantly, the capabilities and capitalization of local financial institutions need to be significantly strengthened. Last but not least, these imperatives must align closely with government policy, priorities and investments to optimally deliver on climate and nature goals within broader food systems transformation agendas.

3

Roadmap to drive a step-change in sustainable food production

With just six annual growing cycles left before 2030, every year counts in the transition to resilient and sustainable food systems. Five concurrent actions can speed up progress.





- 1 **Build out, scale up and replicate breakthrough models for financing and collaboration**
 - Identify and build upon existing initiatives with the potential to fully implement all model elements
- 2 **Promote the engagement of financial actors in the adoption of regenerative agriculture**
 - Catalyse the setting up of more programmes with the necessary coordinating mechanisms in place
 - Develop and deploy financial capabilities (risk modelling and management, development of environmental outcome markets, aggregation of capital)
- 3 **Structure precompetitive collaboration among value chain companies to aggregate demand for environmental outcomes and improved farm resilience**
 - A whole-farm approach across crop rotations is needed that addresses every end-use of outputs and values every ecosystem service delivered
 - Companies should finance their share of the cost of adopting regenerative agriculture on every farm in their value chains
 - All actors should develop capabilities to design, mobilize and participate in next-generation partnerships
- 4 **Establish a consistent and supportive policy and enabling environment**
 - Policy: Make the value proposition for private actors more attractive and easier to prove (e.g. conservation programmes, tax incentives, risk management programmes)
 - Investments: Provide catalytic capital (to kick-start efforts deploying breakthrough models that can be self-sustaining in the long-term) and increase investment in the agricultural "commons" (intellectual assets, human capital, physical infrastructure)
- 5 **Develop a data commons and accelerate marketplace development for all ecosystem services**
 - Collaborate on data aggregation and sharing to demonstrate the business case for new financial solutions and investments
 - Greater standardization and quality of science and data on regenerative agriculture practice implementation and ecosystem service provision
 - Scale up markets and mechanisms (including accounting standards) to support full monetization of ecosystem services

1. Build out, scale up and replicate breakthrough models for financing and collaboration

Building on existing regenerative agriculture adoption efforts wherever possible will help expedite progress. As highlighted in the previous chapter, some existing initiatives have many foundational elements in place. Food and other value chain companies, capital providers and governments can help these initiatives fill the remaining gaps: the provision of the full stack of services to farmers, full monetization of all ecosystem services delivered by regenerative agriculture, aggregation and blending of capital sources to support programmes, and broader participation of the full set of actors that would benefit from adoption or could provide the support growers need.

Once all critical elements are in place, actors should help these initiatives scale up by providing investment and engaging as participants. Well-developed and successful programmes should be replicated through expansion into new geographic areas, either directly or through "white labelling"

of the model. For example, the Soil and Water Outcomes Fund recently partnered with the Cornell Atkinson Center for Sustainability and the New York Corn & Soybean Growers Association to help launch the New York Outcomes Fund (see Soil and Water Outcomes Fund spotlight in the Appendix).¹⁰²

2. Promote the engagement of financial actors in the adoption of regenerative agriculture

Only a few leading agricultural financial services providers are seizing regenerative agriculture opportunities. By supporting farmer adoption, a financial services provider can capture value by improving the financial health of its clients (both farmers and other businesses that depend on farmers), accessing new streams of revenue, providing new value added services for agricultural clients, and making progress on commitments and regulatory obligations to improve its own climate and nature footprint. By engaging more, financial services providers will bring much-needed capabilities, such as risk management, capital aggregation and the ability to re-engineer cash flows for farmers.



To realize the benefits of regenerative agriculture, some financial services actors will need to develop and strengthen new capabilities. Many need to better understand food systems and their role within those systems. They will need to develop the data resources, teams and models to incorporate information about farmers' use of regenerative practices into decisions about new product design, eligibility and terms for loans and insurance (see also Action 5) and, in doing so, can create a competitive advantage. Financial services actors can also help regenerative agriculture programmes by aggregating and coordinating investment from a range of public and private capital providers, developing markets for environmental outcomes, leading engagement with an extensive group of potential buyers, and creating the financial mechanisms required to pay farmers in advance for the expected value of environmental outcomes (see financial services actor spotlight in the Appendix).

Engaging financial actors in the regenerative agriculture transition is likely more challenging in markets where the agricultural financial landscape is more fragmented. In these contexts, leadership and support from other actors in the ecosystem will be essential in bringing smaller lenders and insurers to the table. In some geographies, policy changes or public investment may be needed to support greater innovation in financial offerings (see Action 4). For example, to offer discounts on crop insurance premiums to farmers that adopt regenerative practices, insurers may need policy-makers to modify pricing rules for government-subsidized products or invest to take on incremental risks that insurers face in the early years of adoption.

3. Structure precompetitive collaboration among value chain companies to aggregate demand for environmental outcomes and improved farm resilience

A whole-farm approach is needed to fully support farmer adoption of regenerative agriculture, ensuring every ecosystem service delivered by regenerative agriculture is fully valued and every actor that benefits is contributing. For example, when a farm produces regeneratively grown crops that have several end-uses and differ from year to year as crops are rotated, many downstream processors and end-users will benefit from reduced greenhouse gas emissions or water use in their supply chains and from improved resilience or surety of supply. These groups should therefore support farmer adoption. This same logic should motivate the farm's upstream suppliers to provide support too, including fertiliser, seed, crop protection and equipment providers, who will benefit from similar improvements in the environmental footprint of their value chains and from customers (farmers) with more resilient businesses. Companies across the value chain should seek out others in a given supply shed¹⁰³ or region to collaborate with and should publicly commit to playing their parts in supporting farmer adoption through payment for the ecosystem services and improved farm resilience that regenerative agriculture delivers.

To enable the whole farm approach to value chain company collaboration, the coordinating mechanisms will be essential, as articulated earlier in this report. Value chain companies can work with the actors that play a coordinating role in existing programmes –

grower associations, financial services providers or agtech companies – to scale up existing efforts and help bring coordinating mechanisms to geographies or commodities where adequate coordination does not yet exist. Even if they are not the catalyst, all actors must develop stronger capabilities to effectively participate in next-generation partnerships, collaborating pre-competitively with a broad set of actors inside and outside their value chains.

4. Establish a consistent and supportive policy and enabling environment

Governments have a critical role in driving the faster adoption of regenerative practices – defining the ambition and priorities for the agri-food sector and ensuring that policy and public investment consistently support those priorities.

Policies can help make the business case for private sector companies, investors and farmers to pursue regenerative agriculture – for example, by modifying and expanding conservation programmes, tax incentives that place value on specific ecosystem services, creating blended financing vehicles (e.g. first-loss guarantees) or adapting risk management programmes. Particular care is needed with the deployment of these policy levers as they can, intentionally or otherwise, favour some agriculture value chains (e.g. fuel, feed, food, fibre) over others. More directly, governments can coordinate public agencies and policies to educate and encourage farmers to undertake sustainable production, as envisioned in the EU's Farm to Fork strategy.¹⁰⁴

Policy-makers should also address current (inadvertent) constraints that make the adoption of regenerative practices unnecessarily difficult – for example, by simplifying application or qualification processes for farmers for existing funding opportunities.

Much public investment already goes toward agriculture, often in the form of direct or indirect subsidies or other support for the sector, and holds significant potential to influence greater sustainability efforts. Governments also have an important investment role and should provide catalytic capital in several areas.

First, governments can kick-start programmes that have the potential to become economically self-sustaining. One example in the US is the Soil and Water Outcomes Fund, which is partially funded by the US Department of Agriculture through the Partnerships for Climate-Smart Commodities programme.¹⁰⁵ This innovative programme provides grant funding for pilots of new business models that make the sustainable production of major commodities economically attractive for farmers.¹⁰⁶

Second, catalytic investment can support continued innovation and associated farm-level testing and demonstrations, for example in biological soil additives, that hold the potential to improve the environmental outcomes achievable on a given acre (e.g. increase how much carbon can be sequestered) or help crop insurers provide discounted insurance during the adoption period when insurers will also be bearing higher risks.



Finally, governments are best placed to enhance the capacity of the agricultural sector and invest in the agricultural commons critical to bringing sustainable innovations to market: intellectual assets (e.g. research on the impacts of practice adoption in different agricultural contexts), human capital (e.g. expansion of extension offices and training on regenerative practices for extension employees) or physical infrastructure (e.g. soil health testing capacity).

5. Develop a data commons and accelerate marketplace development for all ecosystem services

Many aspects of breakthrough models for financing and collaboration will require better definition, standardization, measurement, reporting, verification and availability of data about regenerative farming practice adoption and about the impact of practice adoption on both economic outcomes and the provision of ecosystem services.

First, the broad set of actors with roles to play in regenerative agriculture programmes need to align on the protocols for implementing specific regenerative practices, the metrics to measure their implementation and the metrics to measure the ecosystem services they deliver. Much of the current focus on data standards centres on carbon but the need for data standardization is at least as great for other ecosystem services, such as freshwater use and quality or biodiversity.

Some recent efforts have focused on or included these other ecosystem services. In May 2023, the Science Based Targets Network (SBTN) released guidance to help companies define targets for freshwater quality and quantity.¹⁰⁷ The Regenerative Agriculture Metrics workstream currently underway at the World Business Council for Sustainable Development provides another example; it aims to align a broad set of actors on the metrics to use for various ecosystem services (e.g. carbon, water, biodiversity and others).¹⁰⁸ The Sustainable Agriculture Initiative (SAI) Platform's recently launched Regenerating Together framework offers a third example of multistakeholder alignment on outcomes and practices.¹⁰⁹

With more standardized metrics in place, governments and private sector actors will need to collaborate closely on data insights and lessons learned across platforms to support and accelerate the research and analysis on current baselines and the benefits of adopting specific regenerative practices in different agricultural contexts, all while maintaining data ownership and privacy.

Promising innovation is happening in this area but much more is needed. One example is Land Core, a 501(c)3 organization in the US that is building data modelling and infrastructure to demonstrate and quantify the positive impact of regenerative agriculture and help financial actors build the business case for offerings that reward farmers who adopt and maintain regenerative practices.¹¹⁰

The data steps outlined above are critical to developing and scaling the markets and mechanisms (including accounting standards) that will enable the full monetization of ecosystem services. Scaling these markets and mechanisms will require a combination of actions from governments, standard setters and businesses. For carbon, the recent World Economic Forum *Scaling Voluntary Carbon Markets* report outlines these actions.¹¹¹ In the short term, expanding existing carbon credits to include specific co-benefits may most easily capture the value from complex environmental outcomes such as water and biodiversity, adding a premium to the credits generated from a given farm.

Concluding remarks

A step-change in progress toward more sustainable and resilient food systems – and with it, the opportunity to restore and protect much of the planet and capture a wide range of societal returns – is within reach. With greater collaboration and more coordination, particularly on financing, among all food system participants, farmers can receive the flexible financial and technical support they need to adopt sustainable production practices confidently. Breakthrough models for financing and collaboration provide an approach to deliver this farmer support when and where it is needed, as efficiently and equitably as possible and at the scale and pace needed to drive a lasting transformation.

Appendix

Spotlight

The Soil and Water Outcomes Fund

Soil and Water Outcomes Fund (SWOF) is a US-based programme managed by AgOutcomes, a subsidiary of the Iowa Soybean Association.¹¹² SWOF provides services to farmers who implement regenerative practices, including no-till farming, cover crops and extended crop rotations.

SWOF exhibits many elements of a breakthrough model of financing and collaboration, including a services stack for farmers that includes non-financial services and payments. Payments are structured so that farmers receive 50% of the estimated outcomes payments at the time of enrollment and the remaining 50% after the crop year has finished and outcomes have been measured and verified.¹¹³ During its first two years, SWOF made average payments of more than \$30 per acre to enrolled farmers for verified climate and water outcomes.¹¹⁴ Critically, SWOF also monetizes multiple ecosystem services and performs the role of coordinating mechanism, creating a market for environmental outcomes and selling the outcomes from a single field to multiple buyers (e.g. corporate buyers such as PepsiCo and Nutrien and local authorities).¹¹⁵ SWOF is financed by a mix of private and catalytic public funding, including from the United States Department of Agriculture (USDA) Partnerships for Climate-Smart Commodities programme.¹¹⁶

SWOF was initially launched in 2020, with the pilot crop reaching almost 10,000 acres of cropland in Iowa,¹¹⁷ and has since rapidly expanded, with more than 250,000 acres expected to be enrolled¹¹⁸ in 19 states in 2023.¹¹⁹ More than 90% of participating farmers indicated they were “likely or extremely likely to recommend SWOF to a fellow farmer” in 2022.¹²⁰

SWOF’s model has since been replicated and applied to new contexts – new crops and new geographic regions – building on the success of the original programme. **The US Climate Smart Cotton Program** aims to adapt SWOF’s model to

cotton production in 17 states in the southern and southwestern US.¹²¹ **The New York Outcomes Fund** applies SWOF’s model in a new region with new partners.¹²²

SWOF partnered with a group of organizations led by the U.S. Cotton Trust Protocol to launch the U.S. Climate Smart Cotton Program.¹²³ The five-year pilot will provide technical and financial assistance to cotton farmers to advance the adoption of climate-smart practices and build markets for climate-smart cotton.¹²⁴ The cotton programme will be funded by catalytic public investment from the USDA’s Partnership for Climate-Smart Commodities programme and by selling carbon insets to apparel companies.¹²⁵ With \$90 million of funding from the USDA, the cotton programme aims to reach more than 1,000 farmers and more than 1 million acres, resulting in over 4 million bales of climate-smart cotton, more than 1 million tonnes of CO₂e reductions and nearly \$350 million of economic benefits for farmers over five years.¹²⁶

In 2023, SWOF partnered with the New York Corn & Soybean Growers Association and the Cornell Atkinson Center for Sustainability to launch the New York Outcomes Fund.¹²⁷ The programme is funded by an initial investment from the Great Lakes Protection Fund and seeks to support farmer adoption of regenerative agriculture practices in the Great Lakes watershed.¹²⁸ The New York Outcomes Fund replicates many of SWOF’s features (see Figure 9). For example, the programme offers one-year contracts with upfront payments to farmers who adopt regenerative practices such as no-till, cover crops and extended rotations¹²⁹ and sells multiple environmental outcomes generated by these practices, including carbon sequestration and water quality improvements, to a variety of private and public beneficiaries.¹³⁰ In addition, Cornell Atkinson is exploring how the project could be further developed to monetize the biodiversity outcomes associated with the adoption of regenerative practices.¹³¹

Crédit Agricole

Crédit Agricole is a financial services provider that has set a clear ambition to provide comprehensive support to the transition of agri-food systems toward greater sustainability. Crédit Agricole was founded 130 years ago to support the agriculture sector in France.¹³² Today, it is a leading lender to French agri-food companies, with approximately €46 billion of outstanding credit to the agriculture and food processing sector.¹³³

Crédit Agricole has structured a holistic sustainable agri-food approach on five strategic pillars:

1. Promote farming profession attractiveness
2. Contribute to the transition towards low-carbon food
3. Preserve natural resources
4. Develop new nutrition practices
5. Produce through circular economy

Over the past several years, Crédit Agricole has launched a variety of initiatives consistent with these pillars:

- **Mobilizing strategic partnerships and programmes:** Crédit Agricole is working with large agri-food companies to promote the adoption of regenerative agriculture by defining common standards and developing financing solutions that are attractive for the entire value chain.¹³⁴ For example, Crédit Agricole entered into a partnership with Canadian multinational McCain Foods and GAPPI (Groupement d'Agriculteurs Producteurs de Pommes de terre pour l'Industrie) – the potato growers representatives association for industry – to provide up to €40 million in financing and insurance on favourable terms (e.g. interest- and fee-free 6-year loans) to some 800 potato farmers to support adoption of regenerative practices.¹³⁵ Through the partnerships with McCain and others, Crédit Agricole is collecting

data to measure the impact of regenerative agriculture on insurance risks.¹³⁶

- **Mobilizing capital:** Crédit Agricole has launched three financing and investment vehicles dedicated to supporting sustainable agriculture, including debt (€500 million), agri deep tech (€100 million) and private equity (€300 million) vehicles.¹³⁷ The private equity vehicle, *Ambition Agri Agro Investissement*, has a long-term investment horizon (approximately 13 years) and will target small and medium-sized enterprises (SMEs), midcaps and cooperatives in France and Italy.¹³⁸
- **Developing markets for outcomes:** In collaboration with France Carbon Agri, Crédit Agricole is planning the launch of a carbon platform in early 2024.¹³⁹ The platform will include 2,000 agricultural projects that reduce emissions and improve greenhouse gas capture¹⁴⁰ and is aimed at companies and local authorities who wish to offset their carbon footprint beyond their own decarbonization efforts.
- **Building new capabilities:** Crédit Agricole is setting up tools to support dialogue between bank relationship managers and their clients on the topic of sustainability. For example, its *Trajectoires RSE Agri*¹⁴¹ is a platform designed to assess the sustainability and maturity of farmer practices, identify transition opportunities (including financing) and connect farmers with the right set of partners.
- **Supporting innovation:** Crédit Agricole funds scientific research on regenerative practices and their impacts, facilitates connections between agri-food system actors, provides farm data (in compliance with GDPR requirements) and incubates start-ups (e.g. through local “villages by CA” initiatives). Crédit Agricole also provides financing and advice to farmers regarding renewable energy projects (e.g. financing for photovoltaic shade houses).¹⁴²

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