

Climate Resilience in India

Key Insights from
Acumen's Agriculture
Accelerator



Rabo
Foundation

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01

Executive summary

THE CLIMATE CRISIS HAS ARRIVED AT INDIA'S DOORSTEP, AND IT IS HERE TO STAY.

The agricultural economy and the smallholder farmers that are at the center of it must achieve resilience in the face of the environmental and economic changes resulting from climate change. Now, more than ever, the markets have a critical role to play in shaping the future of India's agricultural economy.

The promising trends in the sector commonly referred to as "agri-tech" in India demonstrate the potential of disruption in the agricultural value chain. However, the business models that have scaled may not be improving the resilience of smallholder farmers in a meaningful way. There is hope through an emerging crop of climate-focused business enterprises that are committed to improving the resilience of farmers, and they need urgent attention from the philanthropic and investment community. The Climate Resilient Agriculture Accelerator (CRAA) offered an opportunity for Acumen India to engage more closely with a group of 14 enterprises with this unique thesis.

In the agriculture sector, businesses find it difficult to execute market linkages and drive resilience of farmers sustainably. This was also observed in the CRAA cohort where early-stage, climate-focused enterprises find it difficult to find remunerative markets for farmers. This is an important driver in triggering behavioral change among highly vulnerable and ambiguity-averse farmers.

Partnerships with research universities and farmer collectives are key in adoption of new and sustainable technologies. Other important barriers to scale are the affordability (or lack thereof) of their offerings, inability to access working capital, and challenges in validating their impact thesis.

Philanthropic and investment capital can play a critical role in nudging the ecosystem towards greater rigor in the impact potential of these business models. Acumen's recommendations for the philanthropic and investment community include:

Developing relevant context and feasible climate impact frameworks

- + Aligning on the key vectors of impact
- + Supporting climate impact measurement for a wide range of business models

Directing patient capital towards early-stage enterprises

- + Investing in farm-centric models that are likely to improve farmer resilience
- + Designing innovative financing structures to improve access to debt

Supporting incubator and accelerator programs

- + Developing thematic programs
- + Facilitating access to mentor networks and technical support
- + Inter-disciplinary evaluation expertise

Entrepreneurs in this space need investors and donors to commit to more equitable collaboration through ecosystem-strengthening efforts. Catalytic support to businesses now will set the stage for a more resilient agricultural economy in India in the coming decades.



02

Introduction

IN 2016, USHA DEVI VENKATACHALAM DECIDED TO RETURN TO INDIA after several years as a technology consultant and architect to nonprofits in Washington, D.C. Given her family's roots in agriculture in rural Tamil Nadu, she started the company Krishi Janani with a vision to transform agricultural value chains and make a difference in the lives of smallholder farmers and the environment. She spent the next few years in three districts in Tamil Nadu building trust with the farmer community, aggregating them into buyer groups and helping them purchase inputs, understanding their agricultural practices, and providing training on regenerative practices. Throughout this time, Usha and her small team also focused on building a non-extractive, technology-powered business model that centers the smallholder farmers. In 2021, the team began to build and validate Janani, a farmer-to-consumer marketplace that connects farmers practicing regenerative agriculture to consumers seeking high-quality, verified organic products.

In another part of the country, Jitendra Sinha found himself staying back in rural Odisha, after a career advising international organizations, to develop a sustainable business model that would help smallholder farmers with degraded land live in dignity. Along with his team, he was ultimately able to find a niche customer segment in the paper mill industry that could help build resilient supply chains among smallholder farmers through agroforestry. As India looks to improve the resilience of its farmers, these early-stage start-ups have the potential to do so in the face of climate change.



Background and context

Climate change poses a massive risk to farmers and undermines progress towards poverty alleviation, food security, and sustainable development. Several parts of India are expected to experience higher temperatures and heatwaves, changing precipitation patterns, and intense weather events in the coming few years; temperatures in India are likely to rise by 2.5 to 5 degrees Celsius by the end of the 21st century.¹ Change in productivity patterns because of climate change could reduce annual agricultural incomes by up to 20 to 25%² in the next few years.

Indian agriculture is dominated by smallholder farmers: More than 86% of the total number of Indian farmers have landholdings less than 2 hectares.³ Smallholder farmers face a myriad of challenges across the entire agricultural value chain, which limits their economic potential. Furthermore, despite their importance in Indian agriculture, smallholder farmers earn around \$3 USD per day⁴ and have little opportunity to increase their incomes and productivity. Additionally, smallholder farmers are highly vulnerable to the negative effects of climate change because of:

- + High dependence on rain-fed agriculture
- + Cultivation of marginal areas
- + Lack of access to technical or financial support

These adverse impacts of climate change on smallholder farmers are further amplified

by the existence of widespread poverty. To protect and grow smallholder farmer incomes, and to sustainably feed a growing population into the future, we must increase the climate resilience of smallholder farmers. Resilience is a desired state of being, where a person can anticipate risks, adapt to them, absorb their impact, and bounce back quickly. Climate resilience is the ability of farmers, agricultural communities, and agricultural value chains to maintain or improve their status in the face of climate change.⁵

Acumen has a decade of experience working towards increasing agricultural productivity and incomes in South Asia, sub-Saharan Africa, and Latin America through investments in early-stage agribusinesses that work closely with smallholder farmers as customers or suppliers. Acumen catalyzes innovations and solutions for problems that have a disproportionately negative impact on the lives of the poor through patient capital. For Acumen, patient capital means philanthropically-backed debt or equity investments in early-stage companies that serve poor customers; it is an investing approach that prioritizes maximizing impact over financial returns. Through our investments in 34 inclusive agricultural businesses globally, Acumen has been working closely with entrepreneurs to build scalable business models.

Acumen India has identified three key themes for climate resilient agriculture investments:

- + Regenerative agriculture and resource conservation**
- + Supply chain innovations and wastage reduction**
- + Access to markets and finance**

Regenerative agriculture and resource conservation

The current agricultural production system is highly stressed and is primarily dependent on the usage of chemical fertilizers and unsustainable agricultural practices. There is an over-exploitation of natural resources, such as water and soil, and water scarcity and land degradation are imminent threats for smallholder farmers.

Therefore, there is a critical need to restore the ecological balance of agriculture production systems through regenerative agriculture and improved natural resources management practices. Some examples of potential solutions include: energy-efficient irrigation innovations; water conservation technologies, such as low-cost borewell recharging; eco-friendly inputs; greenhouse models; soil-less farming; and digital advisory or precision agriculture models.

Supply chain innovations and wastage reduction

There are massive wastages across the value chain; it is estimated that 157 metric tons (about 30% of total yield) of food is wasted across the value chain.⁶ These wastages are primarily on account of improper handling of agricultural produce and inadequate post-harvest management, storage, and processing infrastructure at or near the farm gate.

These challenges offer a significant opportunity to improve farmer incomes by addressing the storage and handling of food, as well as making the agricultural supply

chain more efficient. The resulting reduction of waste enables better waste management, extends the use of produce, and prevents excessive resource wastage. Some examples of potential solutions include cold storage and modular storage, processing or value-addition technologies, supply chain traceability and optimization innovations, and distribution and logistics solutions.

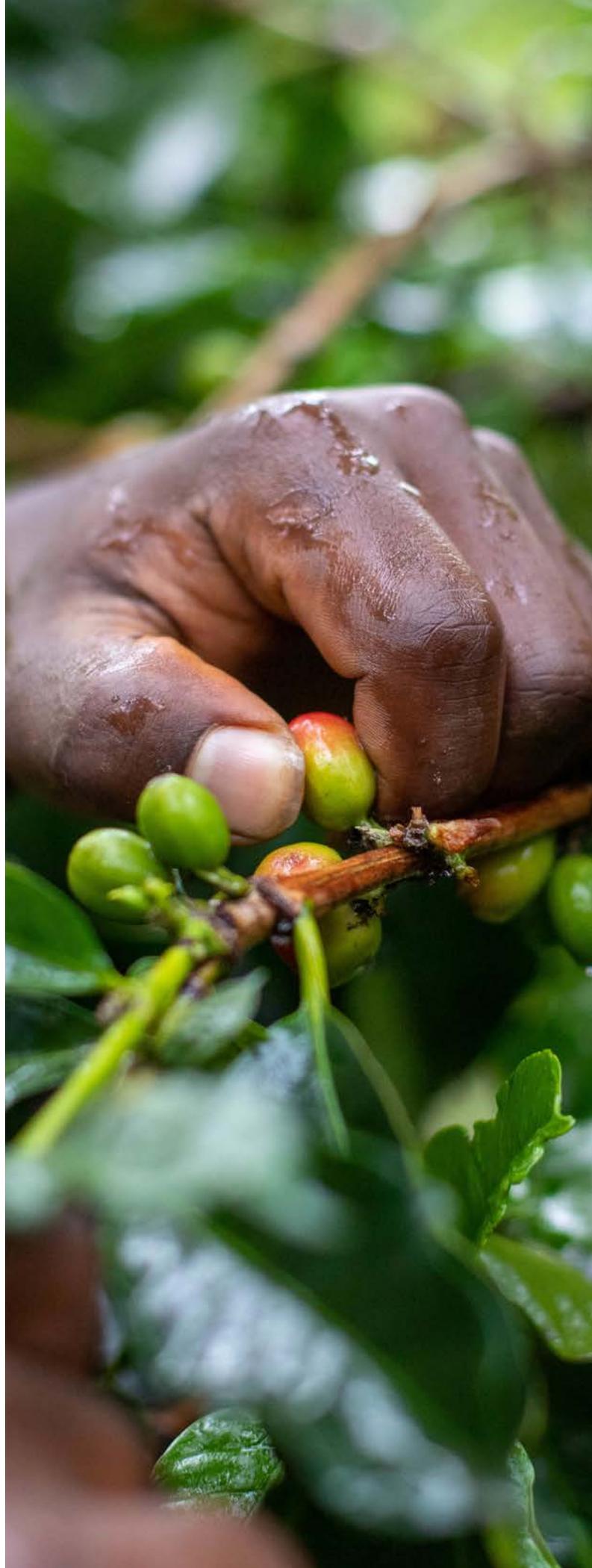
Access to markets and finance

Smallholder farmers are unable to participate meaningfully in the agricultural markets and face significant income volatility and economic uncertainty due to inefficient and broken market linkages. Access to finance from formal sources of finance remains a major challenge for smallholder farmers, and most of them rely on informal money lenders to meet their financing requirements.

Currently, smallholder farmers lack the incentives to adopt sustainable practices. Most sustainable practices have not scaled and are being practiced by less than 4% of the farmers.⁷ Hence, improving access to financing and to markets can reduce the economic uncertainty that smallholder farmers face. Some examples of potential solutions include: aggregator models or platforms providing alternative marketing channels to smallholder farmers, non-bank financial companies or financial institutions providing affordable agricultural credit and other financial products (e.g. insurance, savings products) customized for smallholder farmers. In line with our evolving agriculture investment thesis,

Acumen India believes that the sector needs replicable, scalable, sustainable models that are solving for the above problems. Creating and supporting these models is difficult and requires patient capital and close collaboration between entrepreneurs and investors. In the context of climate change, this need is amplified and requires the investment community to go further.

In order to bolster our efforts in creating and supporting the climate resilience of smallholder farmers, Acumen India, in collaboration with [Acumen Academy](#), conceptualized and executed a targeted, 10-week Climate Resilience Agriculture Accelerator (CRAA) for early-stage enterprises at the intersection of climate and agriculture, held from August to October 2021. This paper outlines the salient features of CRAA as well as documents the key learnings and insights from the program.





03

Climate Resilient Agriculture Accelerator

THE OBJECTIVE OF THE ACCELERATOR WAS TO HELP EARLY-STAGE, CLIMATE RESILIENCE-FOCUSED AGRICULTURE ENTERPRISES

develop scalable models and refine their impact trajectories. The accelerator also provided an opportunity for Acumen to unearth innovative business models and help articulate a sectoral investment thesis at the intersection of climate change and smallholder agriculture.

While the “agri-tech”-focused start-up ecosystem in India is growing at a healthy pace and attracting investor interest, there is a dearth of capital for early-stage, climate-focused businesses. Trends in the funding landscape point to investors backing already proven or mature models or doubling down on their existing investments, especially on the consumer side,⁸ rather than making riskier bets. Hence, Acumen India believes that there is an underserved need for capital in early-stage, climate-focused agribusinesses as well as technical and strategic business support to grow such businesses. There is also a growing consciousness among key stakeholders, such as the central government, about the importance of improving the climate resilience of agricultural communities and value chains.⁹ The CRAA served as an engagement opportunity for Acumen India to support early-stage companies that are addressing the critical needs of smallholder farmers and helping them become more resilient to climate shocks.



Selection Process

The eligibility criteria for application to the CRAA were for-profit enterprises with solutions across the identified investment themes:

- + Regenerative agriculture and resource conservation
- + Supply chain innovations and wastage reduction
- + Access to markets and finance

Enterprises needed to have a track record of at least 12-18 months and evidence of customer demand. **The total number of eligible applications to the program (~130)** is indicative of an emerging ecosystem that is impact-focused and at a stage where they can leverage the support of ecosystem enablers such as incubators and accelerators. **Approximately one-sixth (~24) of the applicants had self-identified solutions across all three investment themes** and are indicative of an emerging understanding among these early-stage entrepreneurs

that bundled services are key to finding a sustainable business model in agriculture. More than 60 of the applicants were in existence for more than three years.

Applicants had operational presence across India with higher density in the states of Maharashtra and Karnataka. The evaluation process involved review of the applications by the Acumen team against a rubric across aspects such as:

- + Understanding of target customers
- + Market traction
- + Financial viability
- + Climate thesis
- + Potential to scale
- + Strength of team
- + Values alignment
- + Participation capabilities

For the final shortlist of 30 applicants, some of these metrics were evaluated through short interviews by the Acumen team.

A list of the selected companies can be found on the following page.

14 companies were selected to be a part of the cohort across three investment themes:

Company name	Regenerative agriculture and resource conservation	Access to markets and finance	Supply chain innovation and wastage reduction
AceWorx		X	
BharatRohan	X	X	
BioPrime	X		
Farmology	X	X	
Frugal Labs	X		
Impagro		X	
Krishi Janani	X	X	
myHarvest Farms	X	X	
NEERX	X		
Rukart Tech		X	X
SAI Sustainable Agro	X	X	
Spudnik Farms	X	X	
Temperate Tech		X	X
Urdhvam	X		

Curriculum Outline

The curriculum consisted of industry-specific case studies, video tutorials, practical readings and assignments, learning labs, and coaching calls with the Acumen team. The cohort also had the opportunity to tap into the expertise and networks of industry experts who collaborated with Acumen as mentors on the program.

Topics Covered:

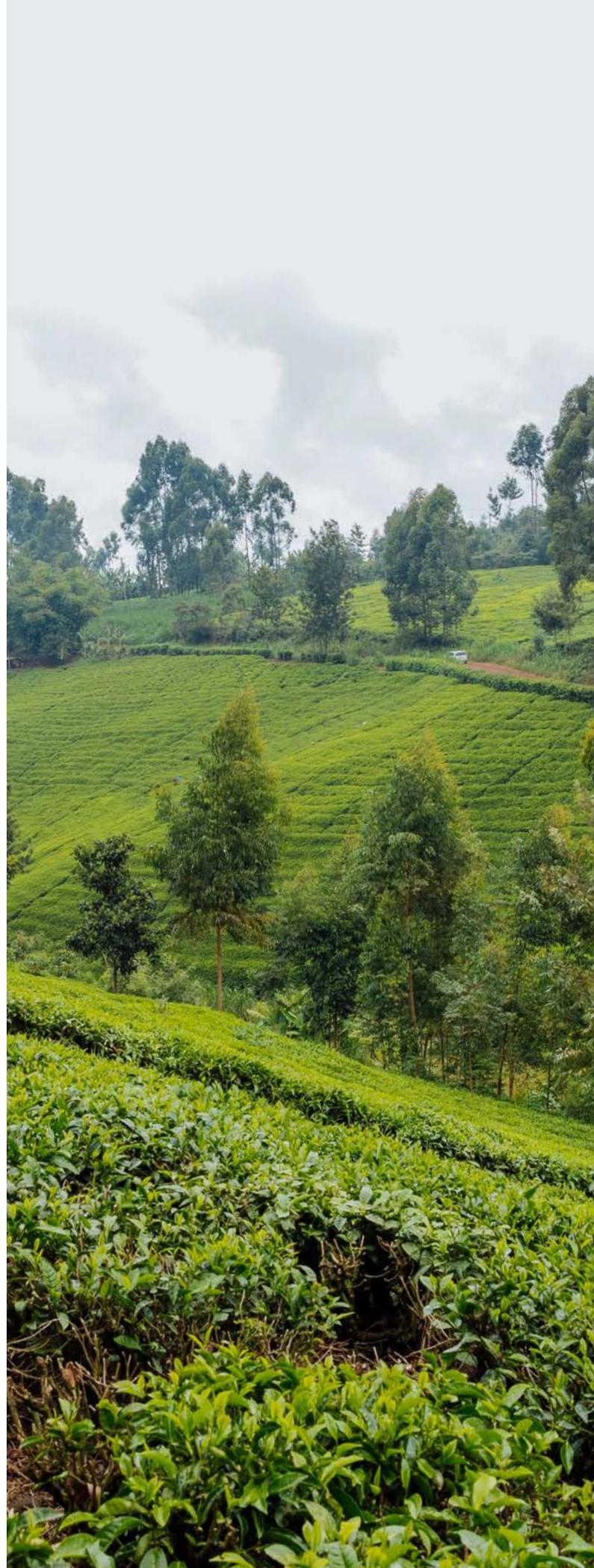
- + Visions of scale
- + Customer insights
- + Measuring and increasing climate resilience
- + Aligning a pricing, sales and marketing strategy
- + Financial model
- + Pitching strategic story

Tools Utilized:

- + Business model canvas
- + Customer experiments
- + Surveys on climate resilience of farmers
- + Value proposition canvas
- + Financial model templates
- + Pitch decks

Engagement:

- + Learning labs
- + Coaching calls
- + One-on-one industry mentor engagement



Curriculum highlight: Climate Resilience Toolkit

Acumen partnered with [60 Decibels](#) to design a climate resilience evaluation framework and toolkit. The goal was to help the early-stage enterprises better understand the climate resilient capacities of the farmers they serve and how they could be improved through their offering or partnership. This framework attempted to provide tangible metrics applicable to a farmer and their farming enterprise.

This was executed through a self-assessment survey where entrepreneurs placed their farmers across a resilience spectrum. Aligned with the framework, the survey consisted of three sections:

- + **Routines** reflecting the farmer's awareness and adoption of sustainable practices.
- + **Resources** meant to capture the farmers' access to, and use of, agricultural products and services that equip them to handle a climate shock.
- + **Recovery** meant to capture a farmer's experience of coping mechanisms with recent shocks, likelihood of receiving future shocks, and access to financial reserves.

The responses to the survey questions allowed the entrepreneurs to understand the vulnerability of the farmers across a four-point scorecard: risky, vulnerable, emerging, and resilient, meant to reflect that resilience is a spectrum.

Business models in the Climate-Resilient Agriculture Accelerator cohort

Adaptation solutions

Some of the businesses were focused on improving the adaptive capacity of smallholder farmers by protecting their incomes or diversifying their sources of income in the face of climate change. Examples from the cohort include:

- + A community farming-based platform that improves farmer livelihoods by upskilling, providing support and market access to farmers' fresh, naturally grown vegetables, fruits, and food products at fair prices.
- + A supply chain management business that offers market linkages, market intelligence support, technical assistance, and capacity enhancement to farmer collectives and helps them access credit.
- + A platform where small farmers get free crop advisory from experts and a community, buy sustainable inputs to reduce the use of chemicals and cost of production, and get a chance to sell their produce at a premium.

Mitigation solutions

There also was a good mix of businesses that were focused on mitigation solutions such as regenerative agriculture practices, water and soil conservation, and reduction in food wastage. Examples from the cohort include:

- + A smart rainwater-harvesting technique that increases rainwater recharge rate of borewells and enhances longevity of water supply by several months, as well as enhances water quality.
- + A marketplace that assists small farmers in transitioning to regenerative agriculture, getting organic certification, and finding high-value markets for farmer produce through their mobile app.
- + Farm-level cold storage solutions and ripening chambers for small and marginal farmers that are energy efficient and have minimal carbon footprint. The company has also developed solar-powered farming equipment and manually operated irrigation pumps.

Key outcomes of the program

Over a 10-week program, participants refined key aspects of their business models and unlocked paths to scale while keeping social and environmental impact at the center. The program was successful in setting the entrepreneurs for success with respect to:

- + [Refining the business models](#)
- + [Sharpening the climate resilience thesis](#)
- + [Peer learning](#)
- + [Access to mentors](#)





Refining the business models

The videos, readings, and assignments that were delivered were well appreciated by the cohort. Participants especially valued the customer design experiments, which helped them refine and iterate their business models. The experiments helped them narrow the focus of their businesses and think strategically about their value proposition to the smallholder farmers.

“Always keep in mind how the solutions we develop will be perceived by farmers that think primarily about risk minimization. This is a result of the assignments set during the program and in particular from how the customer experiments got me thinking about the value proposition to farmers.”

– Suhrid Patel,
Impagro Farming Solutions



Sharpening the climate resilience thesis

While climate resilience was a key focus of the cohort, at the beginning of the program, participants were in the early stages of articulating their climate thesis. Through the 60 Decibels workshop and accompanying tools, the participants were able to understand what it takes to improve the climate resilience of smallholder farmers, and how they can sharpen their climate thesis to maximize their impact. The workshop also helped participants assess the strategies that they were adopting to drive climate resilience of smallholder farmers across defined parameters, and how they can embed some of the learnings into their overall approach to climate resilience.

“Our approach to creating adaptation and mitigation solutions is more defined after the program. We have also created a standard framework for product iteration based on the module on customer experiments.”

– Sumeet Kaur,
Spudnik Farms



Peer learning

Although the program was run in a fully virtual format, the participants expressed their satisfaction on the opportunities to learn from the experiences of other people in the cohort. The participants demonstrated high engagement levels through weekly learning labs that were structured around peer learning. The cohort facilitated informal meet-ups among themselves to discuss common challenges that climate-focused impact businesses face.

“The cohort is a big part of this accelerator. (Climate resilient agriculture) is a huge crisis that is unfolding and it’s this network that’s going to help us move the needle. So, the lesson I’m taking is to build the ecosystem and build the network so that in collaboration we can all take a bite-sized chunk of the crisis.”

– Usha Devi,
Krishi Janani



Access to mentors

The mentorship component of the program was designed to connect the participants to a curated set of industry experts. The mentors provided one-on-one feedback to the participants across critical aspects such as sectoral context, business and operational strategy, farmer centric approaches, and climate impact. They also helped the participants refine their final pitches.

“Beforehand, we weren’t looking at (carbon credits) very seriously because we thought the costs were too high. Now, our mentor has provided us with a different approach that is accessible to us as a small social venture.”

– Deepshikha,
SAI Sustainable Agro



04

Enablers in increasing adoption among smallholder farmers

THROUGH STRUCTURED ENGAGEMENT WITH THE PARTICIPATING TEAMS OVER A 10-WEEK PERIOD, Acumen India had the opportunity to distill the experiences of these enterprises of working with smallholder farmers in various parts of India and identify various factors that influence a smallholder farmer's decision to adopt new climate-resilient offerings and services. Farmers are likely to adopt products and offerings of these enterprises when they address ambiguity around new technology, leverage the power of social networks, and have advisory and market linkage adjacencies.

- + [Creative use of digital technology and aids to address ambiguity aversion](#)
- + [Leveraging the bandwagon effect](#)
- + [Leveraging agricultural research institutions and development organizations](#)
- + [Delivering market linkages and advisory services](#)



Creative use of digital technology and aids to address ambiguity aversion

Most farmers are living through climate shocks and understand risks posed by climate change to some degree:

+ Recent research led by Acumen in Africa demonstrates that farmers have a **deep understanding of the causes of climate change** and the extension of climate shocks beyond seasonal patterns.¹⁰ However, smallholder farmers are unable to factor the **risk surrounding new technology** or sustainable agricultural practices as immediate benefits of adoption, and associated risks of these solutions are often uncertain or unknown. Some of the participating teams cited instances of smallholder farmers wanting to see **immediate impact of new technology**, thereby reflecting bias towards immediate, observable impact, even when the farmers may have already experienced repercussions of climate change.

+ Empirical evidence suggests that, time and again, farmers demonstrate “ambiguity aversion,” or the preference for known risks in comparison to unknown risks. Therefore, despite the acute awareness and lived experience of climate change affecting their farms, smallholder farmers demonstrate preference in favor of tried and tested farming practices because switching costs, whether real or perceived, are high for them.

Early-stage enterprises have attempted different techniques to address this aversion: For example, one enterprise has employed the creative use of visual tools through social media and exhibitions to demonstrate the impact of their groundwater recharging technology.

Case Study: Urdhvam Environmental Technologies

BoreCharger is an affordable, patented, smart rainwater harvesting technique that increases the rainwater recharge rate of borewells by up to 20 times, recharging between 0.4 and 8 million litres of rainwater every year, and enhances longevity of water supply by up to 6 months. The product increases rainwater recharge and enables improved water quality, quantity, and sustainability. The sensors help in managing groundwater demand and adaptation to climate change and promote participatory groundwater management. Their customers include smallholder farmers as well as agribusinesses.

When the company started out, they thought that they would be able to drive adoption among farmers, as water stress is a well-acknowledged issue faced by farmers across the country. However, they realized very quickly that their solution could not be as straightforward. They pivoted their marketing strategy and took to social media to increase awareness about their product among the farmers and other stakeholders in the agricultural value chain.

They tried multiple approaches on social media and realized that exhibitions and awareness-generation webinars are most effective to drive adoption. **An important learning for the team was that without demonstrable and immediate visual impact, it is not easy for farmers to understand the effectiveness of their water management solution.**

Leveraging the bandwagon effect

Another technique that has been employed by early-stage enterprises to address the ambiguity aversion in farmers is leveraging progressive farmers to demonstrate successful use of the technology or offering:

- + The effects of **social learning and networks** could complement or even substitute information delivery or training. As has been demonstrated by research in other contexts, social learning is an important tool in the adoption of new technologies and sustainable agricultural practices among smallholder farmers.¹¹

- + The bandwagon effect, or the effect of demonstrated and **visible proof in immediate social networks** that smallholder farmers are persuaded by, is an important customer acquisition strategy for early-stage enterprises.

Anecdotal reflections from the early-stage enterprises in the cohort have further reaffirmed this approach. Multiple enterprises found the method of engaging a progressive farmer to conduct trials or promote their offering to be impactful. Once there was measured success through the trial, enterprises have shared that the network of farmers in neighboring areas are more willing to adopt.

Case Study: BioPrime AgriSolutions

BioPrime AgriSolutions develops biological inputs that influence the physiological responses of crops and helps them become resilient against adverse climatic conditions. These biologicals also help address the yield gaps and develop uniform fruits and vegetables. **The company's impact measurement strategies are a key component of their marketing strategy when introducing their offerings to a new area.** When introducing their products to a new village, BioPrime conducts trials with the help of

progressive farmers who use their product on a part of their farm at the beginning of the season. At the end of the season, they check in with the farmer to measure the difference in yield between the plot on which BioPrime's products were used and the plot on which their products were not used. Farmers use simple calculations based on the weight of the produce from the different plots and the number of sacks generated. The visible demonstration of such impact on the plots of progressive farmers is a key driver to word-of-mouth marketing and increased adoption among farmers in the surrounding areas.

Leveraging agricultural research institutions and development organizations

Local research institutions, development institutions and non-governmental organizations (NGOs), and farmer collectives play an important role in enabling enterprises to access and engage with smallholder farmers. Several teams in the cohort have **leveraged institutional ties to engage farmers**, in ways including:

- + Agricultural **research institutes** enabling engagement with progressive farmers willing to adopt climate-resilient practices and technologies
- + Development institutions and NGOs partnering to reach farmer collectives
- + **Farmer collectives**, such as farmer producer organizations (FPOs), partnering with several early-stage enterprises

For early-stage enterprises that are attempting to break ground among farmers, it is often these institutional partnerships that open the doors for initial adoption.

Reflections from the enterprises in our cohort indicate that these initial connections with such intermediaries are critical but require consistent engagement and building of trust over the course of many agricultural seasons. A few companies in the cohort have attempted to reach farmers through NGOs or Resource Organizations (RI) and FPOs with varying degrees of success. Government support of FPOs has increased in recent years with dedicated funds and special schemes to develop capacity and improve credit worthiness.¹² Since most of the FPOs in India are at a nascent stage, there needs to be **a high level of engagement** between the start-up and the FPOs, something that an early-stage enterprise may not be able to do due to its own capacity constraints. However, this approach of reaching farmers at scale is a powerful one, as the transaction costs of reaching and serving individual farmers are very high.

Case Study: AceWorx

The founders of AceWorx leveraged their networks with development institutions to design an offering for sustainably produced, high-value agri-food products. Through bespoke interventions for specific high-value commodities, they aim to improve supply chain management, market linkages, value chain financing, and technology

utilization. **One of the key features of their business model is that it engages with FPOs as anchor institutions for transacting with smallholder farmers.**

Building such partnerships with FPOs will help them access markets for sustainably produced products at premium prices. Over time, this will lead to enhanced farmer participation in the FPOs, leading to the sustainability of the FPO as a business entity.

Delivering market linkages and advisory services

The **cognitive burden of making decisions** around new agricultural practices or technology by smallholder farmers is substantial. New technology such as sensors and drones, as well as tasks ranging from preparation of natural inputs to maintaining topsoil, require extensive knowledge and skills.¹³ When the farmers also must spend their limited resources on finding markets for their produce, **the uptake of technology or practices suffer**. Even though it is hard for early-stage enterprises to solve for these challenges consistently and efficiently, farmers come to expect that the enterprise selling the product or technology will also help them use it and then access markets.

Enterprises that work with farmers in adopting regenerative and natural farming practices have had varying degrees of success utilizing market linkages and advisory to drive farmer adoption. Findings include:

- + Program participants recognized the need for **high-engagement advisory models** to sustain adoption of climate-smart solutions among smallholder farmers. These models were expensive, especially considering the knowledge and skill intensity required to adopt these techniques.
- + Some enterprises are experimenting with **lower-cost solutions**, such as mobile-based applications and call centers that serve as knowledge libraries of regenerative farming practices. This engagement further needs to be sustained across multiple seasons.
- + Early-stage enterprises are also beginning to build out market linkages, which is proving to be critical to drive behavior change as well as ensure farmer “stickiness” over the medium to long-term. Enterprises that were enabling market linkages were providing farmers with direct access to customers (removing the multiple layers of intermediaries). When the chain of middlemen is replaced by transparent intermediaries (i.e. early-stage, impact-focused enterprises), there is significant potential for improved climate and economic resilience of smallholder farmers.

At scale, there is an opportunity for these enterprises to demonstrate profitable business models that deliver sustainable crop advisory services and provide access to market linkages as an adjacent offering to smallholder farmers. The impact of such applications and approaches has to be closely monitored and evaluated over a period of time.

Case Studies: BharatRohan

The founders of BharatRohan, with their strong technical background, developed a product offering that provides data to prevent pest attacks and reduce crop loss. With timely acquired data through drone technology, the farmers they partnered with were able to practice precision agriculture practices on the ground.

While farmers were intended to be the initial paying customers for the data, **the team pivoted to a model that offered a comprehensive procurement platform to institutional buyers with traceability as the key value addition.** The solution is vertically integrated and offers farmers and FPOs access to the markets through buyback arrangements. The value proposition for the paying customers is access to pesticide and residue-free agricultural commodities, along with a farm traceability platform. The company is tapping into export market demand, which can offer higher margins for the company and the farmers.

Spudnik Farms

Spudnik Farms secures sustainable livelihoods for farmers by providing them linkages to urban consumers who value safe, healthy food grown through regenerative practices. They have a subscription-based model through which they provide consumers with weekly boxes of organic fruits and heirloom vegetables produced by local smallholder farmers. Spudnik Farms also helps farmers grow sustainably and eliminate food waste by helping them organize production and harvest according to a predetermined demand while also guaranteeing remunerative prices for their produce. To help the farmers mitigate the effects of climate change, they offer trainings on regenerative agriculture practices and encourage water conservation techniques such as drip irrigation and rainwater harvesting.

The B2C model in Spudnik Farms allows them to provide farmers with predictable demand and market linkages to urban customers. In order to improve the scalability of their model, **they are developing a digital advisory application that will provides crop advisory to farmers on regenerative practices, crop planning and management, yield, and harvest estimation.**



05

Barriers to scale for climate focused early-stage enterprises

EARLY-STAGE ENTERPRISES HAVE LIMITED SUCCESS WITH DEVELOPING ROBUST MARKET LINKAGES, accessing working capital, and solving for the affordability problem. These are significant barriers that hamper adoption of their offerings among farmers. In order to attract investment capital, which is imperative to scale, early-stage enterprises also need to validate their impact thesis and communicate this thesis among investors.

- + [Inability to offer robust market linkages](#)
- + [Delayed credit cycles and challenges in working capital](#)
- + [Affordability and lack of end-user financing](#)
- + [Unclear and hard-to-execute climate resilience metrics](#)



Inability to offer robust market linkages

Enterprises which offer access to markets often find it difficult to offer predictability to farmers with respect to quantity of the harvest that will be procured or on the price. To drive adoption of climate-smart agricultural practices, farmers need visibility on their marketing plans through multiple seasons.

Adoption is likely to be successful when the buyers can enter into long-term contracts that guarantee an offtake of the produce.

While providing assured market linkages to farmers is a crucial piece of the puzzle, it is challenging for early-stage enterprises to offer a safety net that will provide the necessary incentive to risk-averse smallholder farmers. Some enterprises have been able to provide offtake by identifying niche opportunities. For example, SAI Sustainable Agro has developed a financially sustainable business model due to its ability to offer reliable market access to vulnerable farmers through its buyback arrangements with paper mills. Other enterprises like Spudnik Farms and Krishi Janani are also attempting to mitigate some of these challenges through value-added products and diversified sources of income for their partner farmers.

Part of the reason why early-stage enterprises are unable to provide alternative, lucrative market linkages to smallholder farmers is the nature of the Indian consumer market that has still not developed sufficiently. **The demand for natural produce is growing, but not enough to enable small buyers to pass on sufficient premium to the farmers.** Even with technology-enabled traceability coming

up in a big way, the enterprises are not always successful in realizing enough premiums that will sustain the engagement of farmers. Several direct-to-consumer models among the early-stage enterprises reflected on the low awareness levels among urban consumers and the underdeveloped market for even certified organic products.

However, given the traction that some of the early-stage enterprises are seeing among large suppliers and institutional buyers, **there are early signs that consumer demand for pesticide and chemical-free products is growing.** Some enterprises are also attempting to tap into export markets where there is greater demand for traceable products and where there is more potential to realize higher prices for smallholder farmers. Another interesting attempt by an enterprise involves developing awareness and demand for organic products among rural consumers through youth and last mile distributors. The maturity of these markets will be a critical driver in improving the resilience of farmers.

Delayed credit cycles and challenges in working capital

For enterprises selling to large institutional buyers or urban grocery chains, they have to manage payment terms ranging from 2 weeks to several months. Further, since many of these enterprises are attempting to displace traders and middlemen, they also have to manage the upfront payment needs of smallholder farmers. **Difficult payment terms with the farmers and buyers create severe stress on**

their working capital requirements. The stress is acutely felt among these enterprises that are attempting to address inefficiencies in the value chain while also developing awareness and appetite for climate resilient agriculture. While some early-stage enterprises like BharatRohan have been successful at setting up revolving credit facilities with debt impact investors and NBFCs, **others have found it difficult to access working capital, which limits the amount of produce they can offtake from smallholder farmers.**

Affordability and lack of end-user financing

For smallholder farmers often earning around \$3 per day, affordability of climate-resilient technologies remains an extremely high barrier when they are the paying customers. Despite the progress made by microfinance and priority sector lending norms, smallholder farmers lack access to institutional credit and other financial products. Early-stage enterprises are attempting to solve for this challenge: for example, **some companies in the cohort offer rent-based and installment models.** There are also few promising trends in the sector around innovative or alternative financing structures such as guarantees, warehouse receipt financing, and pay-per-use models. With farmer collectives improving their capacity and becoming mature, they have the potential to be a paying customer and/or facilitator for some of these alternative financing models. Furthermore, with technology-powered data availability, financial institutions will improve their risk assessment capabilities and ability to lend to farmers.

Unclear and hard-to-execute climate resilience metrics

Going into the accelerator program, several enterprises demonstrated an understanding of the need to measure their climate impact vis-a-vis the farming household and the farm. However, this was also an area where they felt that their model was weak and where they needed help refining and articulating. Nine out of 14 enterprises felt that the maturity of their model with respect to climate mitigation and adaptation impact was low (or less than three on a scale of one to five). Through the workshop conducted by 60 Decibels, participating enterprises were able to identify key gaps where their partner farmers were most vulnerable and identify two or three action steps they could take to improve their offering. However, some enterprises reflected on the difficulty in responding to the survey questions, given that the nature of some of the questions were unlikely to elicit trustworthy responses. Findings included:

- + Understanding resilience of the farming household using the 60 Decibels tools required data on metrics like farmers' coping mechanisms, reliance level on farm income, etc. These were **challenging questions** to pose to a farmer, given their socio-cultural context, and unlikely to elicit trustworthy data.
- + When data was collected from farmers by enterprises in the cohort, it was typically from small samples and through point-in time surveys, making it **harder to assess impact of their offering consistently.**
- + As these enterprises scale across geographic locations, markets, and climate conditions,

data collection on the various aspects of climate resilience (routines, resources, and recovery mechanisms) are harder to collect and aggregate to generate meaningful insights.

+ **Measurement of soil and water health** are particularly challenging due to the costs of measurement and the lack of

alignment on the most indicative proxies. Since some of these measurements are also conducted through formulae and notional measurements, early-stage enterprises struggle to validate their impact as they scale.



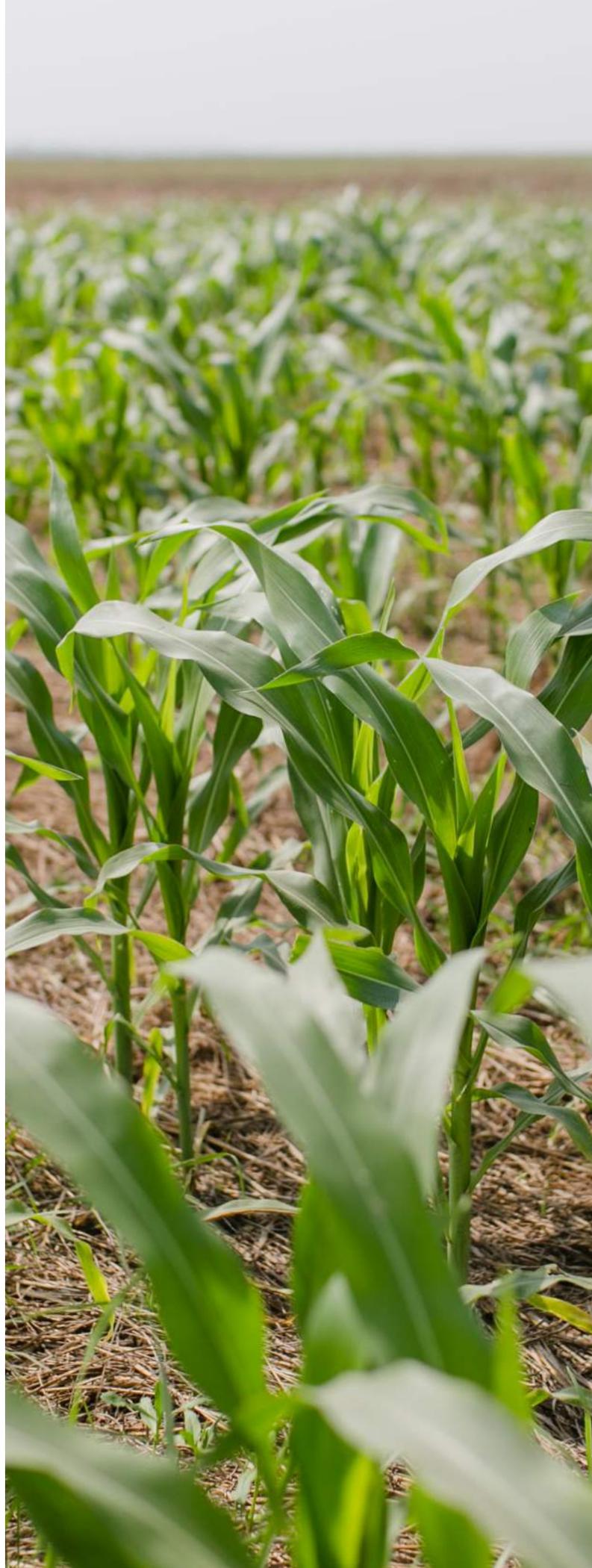


06

Call to action for investors and foundations

EARLY-STAGE, CLIMATE-IMPACT-FOCUSED ENTERPRISES OPERATE IN A COMPLEX MARKET SYSTEM where governments, NGOs, investors, foundations, and development agencies play a significant role. Investors and foundations can play a critical role in helping the sector mature in the following ways:

- + [Developing relevant context and feasible climate impact frameworks](#)
- + [Directing patient capital towards early-stage enterprises](#)
- + [Supporting incubator and accelerator programs](#)



Develop relevant context and feasible climate impact frameworks

Acumen measures the climate resilience of our portfolio companies on smallholder farmers primarily through increase in annual income. Our portfolio companies are also attempting to develop frameworks for measuring reduced cost of chemical inputs and reduction in water consumption levels, among other metrics. However, many of these metrics are extremely hard to evaluate consistently and outside of focused pilots and at scale. **There are no widely applicable outcomes or metrics** that help evaluate the impact of these enterprises. **Given the technical nature of measurement** that is necessary to establish climate impact (mitigation impact in particular), investors struggle to evaluate the climate impact of their portfolios. For investors and entrepreneurs alike, there is an urgent need to align on the key vectors of impact that can help evaluate the impact of these enterprises.

Impact measurement and data collection are already very **labor-intensive and cost-intensive exercises**; adding an additional dimension of climate impact makes it even more difficult. The sector is at the very early stage of understanding what kind of data is valuable and can practically be collected. Impact investors and foundations play a critical role in working with enterprises to cover the costs of such impact measurement and developing industry standards around such frameworks. They can do this by providing philanthropic capital to support **technical assistance on climate impact measurement** for a wide range

of business models. In this way, investors and foundations can be real partners in the process of impact measurement with a focus on learning.

Direct patient capital towards early-stage enterprises

Equity investments in the Indian “agri-tech” sector have reflected a bias towards more mature downstream models.¹⁴ In this context, **farm-centric models** focused on improving resilience of farmers have found it **much more difficult to fundraise**. Findings include:

- + Increase in investments in downstream models has been disproportionate to investment in the overall sector. Investments in farm-centric models have been less than a quarter of the total investments in the sector between 2019-20.¹⁵
- + Climate-focused enterprises that were part of the CRAA cohort also echoed fundraising challenges; 11 out of 14 enterprises rated their funding strategies low, (less than three on a scale of one to five) as they found it difficult to find traction among equity investors.

Therefore, there is a real need for early-stage, equity investments by investors with greater risk appetite so that climate-focused agriculture enterprises are able to scale.

Over and above equity funding, such enterprises also **lack access to debt funding**. Given the difficulties in **managing working capital** that are unique to such enterprises, there is a role

that foundations and impact investors can play in improving their access to credit.

From the cohort of early-stage enterprises, we learned that enterprises that have been in the market for more than a few years on average have been able to tap into revolving credit facilities from banks and non-banking financial companies. However, younger start ups at smaller scale find it extremely difficult to avail revolving credit facilities. Banks and financial institutions lending to more mature enterprises demand first-loss default guarantees between 20% and 50%.¹⁶

Given that financial institutions serving such enterprises are few and far between, philanthropic and concessionary capital can be deployed creatively. While access to debt financing is difficult for start-ups in general, for climate-focused agriculture enterprises that have an added layer of risk, there is need to create **innovative financing structures** such as pay-for-success models, unsecured debt facilities, and guarantees, which can help de-risk these business models and unlock more commercial capital into the space.

Support incubator and accelerator programs

Ecosystem enablers such as incubation and acceleration programs will play an important role in the growth of this sector. In the last few years, a few different programs have emerged to serve these enterprises in India, including the [CISCO Agri Challenge](#), the [World Resources Institute Land Accelerator Program](#), and [Atal Incubation Center-Sangam Emerging India Acceleration Program](#).

Such programs offer business model support and mentorship access that is necessary to develop their potential to scale. As was evident in the Climate Resilience Agriculture Accelerator, the cohort was also able to leverage the breadth of offerings among themselves to form partnerships. For example, an input-focused enterprise found a new channel partner and reach new geographies through their participation in the accelerator.

To serve the emerging sector of enterprises with this focus, such programs should be funded and scaled. It is important to create an enabling environment for the climate-focused start-ups to thrive and grow, thereby helping them drive large-scale adoption among smallholder farmers. Potential pathways include:

- + **Thematic incubation/acceleration programs:** Enterprises with a high level of engagement with smallholder farmers and a focus on climate impact learn from each other, especially when they focus on different parts of the value chain. Tailored cohorts also provide collaboration opportunities for enterprises among themselves.
- + **Access to mentor networks and technical support:** Consistent engagement through mentor networks and technical advisory around climate is critical for these early-stage enterprises that often have to iterate on their business models due to the complexity of the sector.
- + **Inter-disciplinary evaluation expertise:** Social entrepreneurs and impact investors alike currently lack the tools to evaluate or measure climate impact of business models in a rigorous and feasible way. This problem calls for collaborative problem solving with evaluation experts and climate scientists.



07

Conclusion

THE CLIMATE RESILIENT AGRICULTURE ACCELERATOR OFFERED A STRUCTURED ENGAGEMENT OPPORTUNITY

with the new crop of climate-focused, early-stage enterprises in the burgeoning “agri-tech” ecosystem in India. The unique and complex problems that climate-focused agricultural enterprises are attempting to solve for merit further attention from the philanthropic and investment community. Given the urgency with which developing countries need to address the effects of climate change in sectors like agriculture, it is imperative that stakeholders such as government, corporate social responsibility departments, foundations, bilateral and multilateral institutions, research organizations, and NGOs be invested in collaborative approaches.

While challenges continue to exist in scaling climate smart agricultural solutions, there is also significant potential for growth and innovation to unlock the full potential of climate-focused agriculture enterprises. Investors and foundations play a critical role at this point of time and should leverage their capital and partnerships to:

- + Invest in climate-focused business models that are centered on improving the climate resilience of smallholder farmers.
- + Provide philanthropic and concessionary capital in the form of first-loss guarantees and blended finance structures to address working capital requirements.
- + Work with enterprises to define outcomes and collect impact metrics that can be feasibly implemented and that are valuable to their business strategies.
- + Support ecosystem enablers such as incubator and accelerator programs that provide strategic business and technical support to early-stage enterprises.

Acumen invites collaborators as we continue to further our understanding of how entrepreneurial solutions can improve the climate resilience of smallholder farmers.

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About the Report

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