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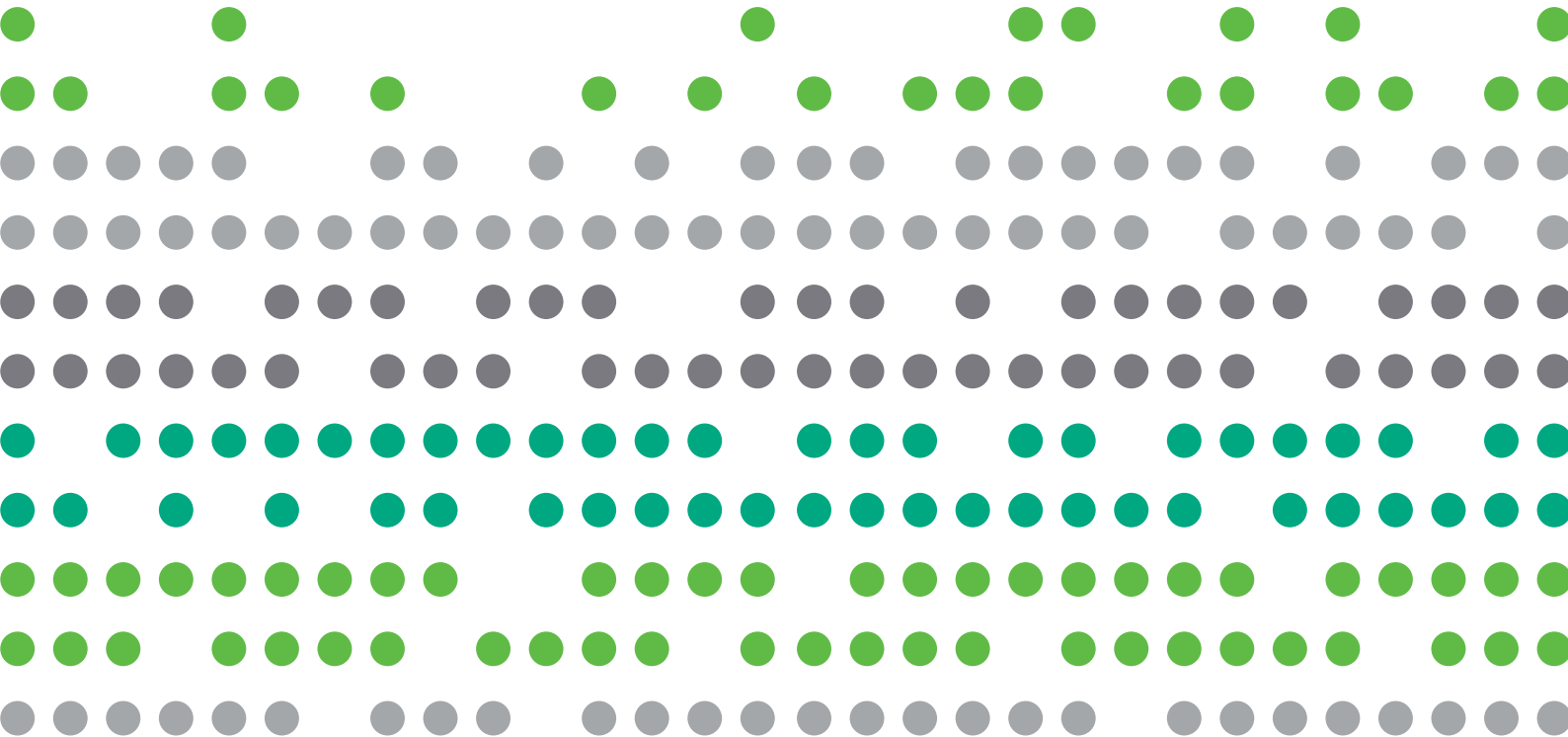
Climate Bonds INITIATIVE

INDIA INSIGHTS

# FINANCING SUSTAINABLE AGRICULTURE IN INDIA

Opportunities, Challenges, and the Way Forward

September 2021



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# About the Climate Bonds Initiative

Climate Bonds Initiative (CBI) is an international, investor-focused not-for-profit initiative. CBI is the only organisation working solely on mobilising the \$100 trillion bond market for climate change solutions. We achieve this through the development of the Climate Bonds Standard and Certification Scheme, Policy Engagement, and Market Intelligence work. We empower our partner organisations with the tools and knowledge needed to navigate, influence, and instigate change.

# Acknowledgments

This report is a culmination of contributions from and insightful conversations with several experts in this field. We would like to thank the contributors to this report: Arindom Datta (Rabo Foundation), Nagendra Rajawat (Ananya Finance), Hari Rajagopal (Samunnati Finance), Dirk Dijkma and Prashant Bhardwaj (Symbiotics), Shaikh Tariq Mobin (Villgro), Vikram Anand (Farmguru), and Purnima Khandelal (INI Farms).

We would like to acknowledge the contributions of the project team on Climate Resilient Agriculture, which the Climate Bonds Initiative is executing with the World Research Institute; Prashant Vaze, Karthik Iyer, and Neha Kumar from the Climate Bonds Initiative; and Arivudai Nambi Appadurai, Shubham Gupta, Parvathi Preethan, and Gaia Larsen from the World Research Institute.

We would like to thank the experts who peer reviewed the drafts and provided critical feedback, including Emmanuel Murray (Caspian Group), Sanjay Sethi (Technopak Advisors), and Meera Siva (Board Member of the CFA Society India).

We would also like to thank the countless experts who generously gave their time and insights: Sandeep Roy Chaudhari (VNV Advisory), Joseph Prakash (Meghraj Capital), Samrat Mukherjee, T. S. R. Gain, Sachin Vishnu Kamble, Kuldeep Singh, Dr. Sunil Kumar, Shankar A. Pande, B. Suri Babu, Jaideep Shrivastava, B. G. Mukhopadhaya (NABARD), Namita Vikas (Auctus ESG), Starlene Sharma (Green Artha), Sai Gole (Bharat Agri), Kavita Sharma (WRI), Kavita Sachwani (2030 Water Resources Group), Royston Braganza (Grameen Impact Capital), Sourajit Aiyer (South Asia Fast Track), Dr. Satyanarayana Masabathula (Veda Climate Change solutions), Vijay Kumar, Murli (RYSS), Hemendra Mathur (Bharat Innovation Fund), Mr. Crispino Lobo (WOTR), Tushar Jindal, Abhishek Bansal (Arvind Group), Mukul Agarwal (India Rayon), Shivananda Shetty (ERM Consultancy), Sreemoyee Bhattacharya (Marico Industries Limited), Satya Tripathi (UNEP), Anshuman Das, Nivedita Varshneya, Gagan Mehta, Philippe Dresruesse (Welthungerhilfe), Indra Guha, Dipankar Ghosh, and Prateek Sengupta (Think Through Consulting).

Last but not least, we are grateful to Vidhu Shekhar, senior country head (India), CFA Institute; and Mary Leung, head of advocacy, APAC, CFA Institute, for guiding us throughout the project.

Thank you.

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# Executive Summary

The impact of climate change is increasingly evident. The frequency and intensity of the heavy downpours, hurricanes, and heat waves in places where this previously was not conceivable have made it necessary not only to limit carbon emissions but also to adapt to changes that are already occurring and likely to worsen in the future.

## Importance of Financing Sustainable Agriculture

The Agriculture, Forestry, and Land Use (AFOLU) sector contributes to 21% of the global greenhouse gas (GHG) emissions, second only to energy (~25%).<sup>1</sup> Agriculture is particularly vulnerable to climate change, in terms of yields and nutritional content of grains. In India, the sector is the primary source of livelihood for about 58% of India's population and contributes to global food security as one of the major producers of agro-commodities. The increase of farm yields since 1947 has been attributed to the use of fertilisers and pesticides, but these chemicals are proving to be deleterious to soil and groundwater health, in addition to causing a loss of biodiversity. Therefore, financing the transition to sustainable, or climate-resilient, agriculture is vital.

## Report Outline and Intended Audience

In this report, we briefly chart the AFOLU landscape in India and discuss how climate change is affecting agriculture. We describe the various facets of sustainable agriculture, such as farming techniques and new technologies, as well as the roles played by corporations and customers. We present the challenges in scaling up financing in sustainable agriculture projects and describe three financing models through instructive case studies. We conclude with several recommendations for policymakers and other stakeholders to catalyse financing at a larger scale.

The report is targeted at Indian banks, venture capital (VC) investors, multilateral development institutions, and Indian policymakers. It is also intended to raise awareness among CFA Institute members and mainstream investors with an interest in sustainable finance but may not have had exposure to the subject.

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<sup>1</sup> Ministry of Environment, Forests, and Climate Change, "Performance of National Action Plan on Climate Change, 2018-19" (Lok Sabha Secretariat, New Delhi, 13 December 2018), [http://www.indiaenvironmentportal.org.in/files/file/Performance%20of%20the%20National%20Action%20Plan%20on%20Climate%20Change%20\(NAPCC\).pdf](http://www.indiaenvironmentportal.org.in/files/file/Performance%20of%20the%20National%20Action%20Plan%20on%20Climate%20Change%20(NAPCC).pdf).



## Facets of Climate-Resilient Agriculture

- **Natural farming methods** not only have lower life-cycle emissions than conventional farming methods<sup>2</sup> but also better withstand the vagaries of adverse weather conditions, thus making a case for climate resilience. Studies have indicated that yields under natural farming methods are likely lower than conventional methods over the short term, but they may be better over the long term, and this must be balanced against improvements in climate and financial resilience.
- **Infrastructure and technologies** include elevated platforms to house photovoltaic (PV) panels on top of agricultural lands to generate solar power. These platforms are also known to facilitate better yields in crops which prefer shade. Technologies such as sprinkler and drip irrigation are key infrastructure that promote more crops per drop of water.
- **Companies** involved in production of fossil-fuel based inputs, such as fertilisers, are adapting to climate change concerns by shifting their focus to organic fertilisers and bio-stimulants, which reduce the need for fertilisers in the first place.
- **Consumer preferences** and the ability to command a premium may play a role, but in the Indian context, preference alone is insufficient to transform the majority of landholdings to sustainable agriculture. Other factors like better economics for farmers through lower input costs and crop resilience need to work in tandem.

## Challenges in Scaling Up Sustainable Agriculture

1. It is difficult to put large amounts of capital to work because of the smaller nature of most operations.
2. An appropriate framework is lacking to evaluate projects along the impact and financial dimensions in a consistent manner.
3. Awareness is low among farmers around climate-resilient farm practices. It is not sufficient to answer the question how climate-resilient agriculture benefits the environment. How it benefits the farmer also is essential.
4. Projects have long gestation periods, which make them risky. The assets (i.e., landholdings) are difficult to collateralise, which makes banks reluctant to lend.
5. Central banks do not account for climate-related risks in the computation of risk weights. Because banks are the largest source of financing, the lack of distinction between the status quo and climate-resilient agriculture creates obstacles in scaling up the latter.

<sup>2</sup> Food and Agriculture Organisation of the United Nations (FAO), "Organic Agriculture and Climate Change," <http://www.fao.org/organicag/oa-specialfeatures/oa-climatechange/en/>.

## Models for Financing Sustainable Agriculture

The traditional instruments used to deploy climate finance are grants, concessional loans, guarantees, and ultra-long-term equity, which are willing to cap returns at the project level. In response to the challenges in attracting private capital in sustainable agriculture projects, however, several other financing models have emerged, including the following:

- **Blended finance** has become popular in recent years as donors have recognized the increasing need to attract private capital to address development objectives. Blending public sources works best when the perceived risks in the market are higher than the actual risks, and when they demonstrate commercial viability. The bulk of the financing in recent years went to energy and financial services, with agriculture accounting for only a small portion. The transaction sizes in agriculture are also smaller, with a median size of around US\$25 million. We will describe a blended finance transaction in the case study "Villgro: Incubator and VC Specializing in Social Enterprises Including Agriculture."
- **Green bonds** have become an instrument of enabling access to capital for environmentally friendly causes, including in agriculture. In South Asia, given the dominance of small farmers and periodic instances of farm distress, the social development aspects are equally important. Therefore, social bonds, for which the terms of financing like interest rates can be linked to social development targets are useful instruments. Our case study "Symbiotics/Samunnati Social Bonds" provides an illustration of how they are structured in this area.
- **VC** is well-suited for funding disruptive innovations in technologies, advice, and business models which are critical for achieving climate resilience and scale. AgTech is defined as a segment of companies that uses technology in the field of agriculture to improve productivity, efficiency, and output. The growth in AgTech is driven by affordable data and inexpensive handsets that enable companies to offer complex and timely advice on agricultural techniques, monitor and control and supply chains, and create market linkages, thus improving climate and financial resilience. In the Villgro case study, we describe an approach for selecting AgTech investments and financing through various stages, while using blended finance as needed.

## Call to Action

Catalysing private capital for sustainable agriculture requires a concerted effort from various stakeholders. Table 1 describes the call to action and suggests the relevant parties to take action.

**Table 1. Call to Action**

No.	Call to Action	Description	Parties to Take Action
1	Develop a taxonomy for sustainable agriculture	There needs to be a consistent and comparable taxonomy of activities, calibrated against physical risks from climate change, which will constitute "sustainable agriculture."	National Bank for Agriculture and Rural Development, Ministry of Agriculture, Indian Council of Agriculture Research
2	Address training and capacity needs of stakeholders	This is applicable not only to farmers, but also to the workforce of financial institutions on how to conduct due diligence on sustainable agriculture projects and track social impact outcomes.	Banker's Institute of Rural Development, philanthropies who work with farmer producer organisations (FPOs), various Krishi Vigyan Kendras <sup>3</sup>
3	Provide state government support for basic research in climate-resilient agriculture	In addition to financing and training support, state governments can sponsor additional research, especially long-horizon studies on the benefits of sustainable agriculture practices compared with conventional methods, to enable greater adoption among institutions and FPOs.	Ministry of Agriculture of State Governments
4	Leverage data and technology to increase formalisation of AgTech sector	A reason for low levels of bank lending is that many farmers lack credit history. If data were shared between AgTech firms (which work with farmers) and banks, this could lead to better credit evaluation and reduce the cost of loans.	AgTechs, banks, FPOs

<sup>3</sup>Krishi Vigyan Kendra (translation: farm science centre) is a part of the National Agricultural Research System. It evaluates location-specific technology modules in agriculture and allied enterprises, through technology assessment, refinement, and demonstrations. Krishi Vigyan Kendra Knowledge Network, <https://kvk.icar.gov.in/>.

# 1. Introduction

Climate change is one of the most important issues of our time. According to a 2021 report of the Intergovernmental Panel for Climate Change (IPCC), human activities have already caused the planet to warm by 1°C above pre-industrial levels.<sup>4</sup> Global warming is likely to exceed 1.5°C during the 21st century in most of the scenarios and to exceed 2°C in some of the scenarios considered in the report.<sup>5</sup> Although higher warming levels may translate to more frequent extreme temperatures that affect agriculture and health, even at 1.5°C warmer, our planet may experience frequent and heavy precipitation and flooding.<sup>6</sup>

Therefore, adapting to the warming world (climate adaptation) is an essential complement to reducing carbon emissions to halt the impact of climate change (climate mitigation). The financing of climate adaptation projects, however, has lagged that of climate mitigation projects by a wide margin. According to Organisation for Economic Co-operation and Development (OECD) estimates, the climate finance provided or mobilised in industrial countries for climate action in emerging countries was \$71 billion in 2017.<sup>7</sup> Of this, 73% was allocated to climate mitigation projects, whereas just 19% was allocated to adaptation activities, with the remaining 8% cross-cutting both mitigation and adaptation activities. The split is only marginally better than the corresponding figures in 2013: 76% mitigation, 17% adaptation, and 7% cross-cutting both.<sup>8</sup>

In addition, financing is not flowing to priority sectors like agriculture, or generally, to the Agriculture, Forestry, and Other Land Use (AFOLU) sector, which has a strong need for substantial investments in adaptation projects, to maintain soil health, yields, and nutritional quality to meet the growing demand of populations. Although governments and development financial institutions will continue to play a major role, catalysing investments from mainstream investors will be key to meeting the scale of the challenge.

The lack of financing from mainstream investors may be especially acute for emerging economies, like India, where owing to local factors, such as small landholdings of farmers, private investors may be reluctant to step in without adequate incentives. In response to these challenges, several financing models have emerged in recent years.

<sup>4</sup> Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2021: The Physical Science Basis, Summary for Policy Makers," 7 August 2021, [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_SPM.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf).

<sup>5</sup> IPCC, "Climate Change 2021," 19.

<sup>6</sup> IPCC, "Climate Change 2021," 32.

<sup>7</sup> Organisation for Economic Co-operation and Development (OECD), "Climate Finance for Developing Countries Reached USD 71 Billion in 2017" (OECD, Paris, 13 September 2019), <https://www.oecd.org/environment/climate-finance-for-developing-countries-reached-usd-71-billion-in-2017.htm>.

<sup>8</sup> OECD, "Climate Finance for Developing Countries."

In our brief report, we illustrate the efforts to scale up financing for sustainable agriculture projects in India, with the help of case studies. The rest of the report is structured as follows: Section 2 briefly charts the AFOLU landscape in India and explains how climate change is affecting agriculture. Section 3 describes the various facets of sustainable agriculture, such as farming techniques, the role of technologies, and the role of customers and corporations. The primary focus is financing, but a rudimentary understanding of innovations and emerging technologies reveals the exciting opportunities in this area and provides a better context for later sections.

Section 4 presents the challenges for scaling up financing in sustainable agriculture projects. Section 5 describes three models for financing sustainable agriculture products, including blended finance, green and social bonds, and VC financing for agriculture technology (AgTech) companies. These models are not mutually exclusive, but they do represent important elements in the quest for catalysing private capital. Section 6 provides a few recommendations for policymakers and investors to enable the right conditions for financing at a larger scale. Section 7 describes three case studies for financing sustainable agriculture. Section 8 concludes.

## 2. Sustainable Landscapes

Agriculture, the main component of Agriculture, Forestry, and Other Land Uses (AFOLU), is the primary source of livelihood for about 58% of India's population.<sup>9</sup> The total agricultural exports from India grew at a compounded annual growth rate of 14.61% over FY10–19 to the tune of US\$38.54 billion in FY19, indicative of significant economic potential, in addition to contributing to national food security.<sup>10</sup>

Farm yields have improved since independence largely because of the heavy use of chemical fertilisers and pesticides. This use has brought self-sufficiency, compared with the prevailing situation following independence when the country was reliant on food aid. Over time, however, although the use of high-value inputs has had an impact of farm incomes, it also has affected the natural resource base, including soil nutrition, water, and agro-biodiversity.

A two-way relationship exists between agriculture and climate change. Agriculture contributes significantly to climate change, and climate change negatively affects agriculture. The AFOLU sector contributes to 21% of the global greenhouse gas (GHG) emissions, second only to energy production sector (~25%).<sup>11</sup> While the overall percentage GHG contribution of AFOLU sector is progressively decreasing, the absolute GHG emissions from the sector are increasing. For example, between 1974 and 2014, emissions from agriculture went up by 80%, even as its contribution to total emissions fell from 33% to 15%.<sup>12</sup> The environmental costs come in the form of deforestation to make way for agriculture; methane emissions from rice cultivation; and usage of chemical inputs, emissions from livestock, and burning of crop residues and biomass, among others.

Climate change negatively affects Indian agricultural productivity and quality. If no adaptation is followed, climate change is expected to reduce Indian wheat yields by 6–23% in 2050, and rice yields by up to 6%, according to a 2018 Report of National Action Plan on Climate Change, an Indian government policy document.<sup>13</sup> Climate change is also expected to reduce the nutritional content of grains, with lower levels of grain protein and lower levels of zinc and iron. These are not merely projections. Increasing incidences of drought, storms, and intense precipitation are already affecting agriculture. Thus, making agriculture climate resilient is integral to the country's target of doubling farmer income by 2022–2023. There is cause for hope: with adaptation, the report projects wheat yields

<sup>9</sup> India Brand Equity Foundation (IBEF), "Agriculture in India: Information about Indian Agriculture and Its Importance," 11 August 2021, <https://www.ibef.org/industry/agriculture-india.aspx>.

<sup>10</sup> IBEF, "Agriculture in India."

<sup>11</sup> IBEF, "Agriculture in India."

<sup>12</sup> IBEF, "Agriculture in India."

<sup>13</sup> Ministry of Environment, Forests, and Climate Change, "Performance of National Action Plan on Climate Change, 2018–19."

could be increased by 10% and rice yields by up to 20%.<sup>14</sup> Investments in climate-resilient agriculture would have multiple benefits, including a reduction in agrarian distress, ensuring stability and enhancing farmers' income.

Agriculture is not the only area of concern within the AFOLU sector. Approximately 25% of India's territory (78 million hectares) is covered by forests and trees,<sup>15</sup> which supports a rich collection of biodiversity, provides a range of products and ecosystem services, and supports the livelihood of 300 million Indians.<sup>16</sup> Clearing of land for agriculture, and the need for fuel wood, timber, and other forest products, however, exceed the country's ability to sustain quality forests. Currently, the deficit is met through domestic agroforestry and imports, but energy demand is expected to increase because of rising populations and accelerated economic growth. As a result, forest degradation is a growing concern, even if forest cover has remained almost constant over the past two decades. More than 40% of India's forest are degraded,<sup>17</sup> and many dense forests are negatively affected, leading to increased GHG emissions.

AFOLU sector's impact on climate ultimately may challenge the country's ability to maintain food security. Efforts must be made to decrease the impact of the AFOLU sector on the overall GHG emissions (i.e., sustainable landscapes). Thus, good practices must be promoted by players in the ecosystem, including large buyers of agricultural produce, as well as regulatory and educational institutions, which will allow agriculture to flourish without compromising the forest ecosystem and biodiversity. This effort includes supporting activities that reduce land-based emissions, including practicing agroforestry, sustainable forest management, and climate-resilient agriculture, all of which are part of sustainable landscapes. In the next section, we discuss the facets of climate-resilient agriculture.

<sup>14</sup> Ministry of Environment, Forests, and Climate Change, "Performance of National Action Plan on Climate Change, 2018-19.

<sup>15</sup> Mayank Aggarwal, "India's Forest Cover Is Rising but Northeast and Tribal Areas Lose," *Mongabay*, 3 January 2020, <https://india.mongabay.com/2020/01/indias-forest-cover-is-rising-but-northeast-and-tribals-lose/>.

<sup>16</sup> P. K. Biswas, "Forest, People and Livelihoods: The Need for Participatory Management," <http://www.fao.org/3/XII/0586-C1.htm>.

<sup>17</sup> U.S. Agency for International Development, "Partnership for Sustainable Forests in India," 10 August 2021, <https://www.usaid.gov/India/partnership-sustainable-forests-india>

# 3. Various Facets of Climate-Resilient Agriculture

Climate-resilient agriculture contains facets, such as natural or low-input farming techniques, the role of technologies and infrastructure, consumer preferences, and climate-resilient transition by corporations, each of which we cover in turn. This section provides the reader a wide-ranging perspective on the topic, but it is by no means exhaustive.

## 3.1. Natural or Low-Input Farming Techniques

As the impacts of climate change on agriculture are growing, the natural farming approaches are gaining importance. The primary assumption behind natural farming methods is that both the input costs for farmers and climate impact are considerably reduced because of the reduction in fossil-fuel-dependent sources. Life-cycle assessments also show that emissions from conventional farming is always higher than natural farming methods.<sup>18</sup> Among the many such methods, the most popular one currently is community-based natural farming (CBNF, previously known as zero-budget natural farming). CBNF was institutionalised initially by the state of Andhra Pradesh and later by Himanchal Pradesh. To fully explore the potential of CBNF as an agricultural strategy, empirical research is being conducted jointly by the state government arm and the University of Reading (UK) to understand the social dynamics and scientific processes taking place through this farming method.

Although the claims on the benefits of CBNF must be validated scientifically, preliminary findings seem to point out that crops cultivated under this technique withstand the vagaries of adverse weather conditions, reducing water intake and maximizing water use efficiency, thus making a case for climate resilience.

More generally, acceptance is growing that moving away from heavy chemical inputs can improve the livelihoods and well-being of many farmers, notwithstanding the potential drop in yields. Studies suggest that yields from organic farming methods are lower than conventional methods over the short and medium term but that they may be similar or better over the long term. A 2015 meta-study of 115 short-term studies comparing organic and conventional farming methods showed that yields from organic farming methods were lower than conventional methods by 19% (+/-3.7%), smaller than the gap estimated

<sup>18</sup> FAO, "Organic Agriculture and Climate Change."



by previous studies.<sup>19</sup> More important, crop diversification practices, such as multi-cropping (growing two or more crops during a growing season) and crop rotation (growing different crops sequentially on the same plot of land), reduce the gap to 8% (+/-5%) when applied in only organic systems. Fewer long-term studies (over 30 years) have been conducted, but the studies completed to date have demonstrated that productivity of organic farming methods may be equal to or better than conventional yields.<sup>20</sup>

The natural cultivation techniques can be applied to small farmholdings, which is important because the average Indian farm size holding was just 1.08 hectares in 2015–2016.<sup>21</sup> The likely drop in yields needs to be balanced against the improvement in both the climate resilience and financial resilience of farmers, with the latter stemming from the cost savings on the use of fertilisers and pesticides. The import value of fertilisers stood at around \$7.3 billion in FY20,<sup>22</sup> also demonstrating that natural farming techniques have enormous implications for self-reliance.

## 3.2. The Role of Infrastructure and Technologies

Infrastructure and technologies form the backbone of climate resilience. Elevated platforms to house photovoltaic (PV) panels on top of agricultural lands not only generate solar power but also facilitate better yields in crops that prefer shade like banana, tomato, pepper, and cotton. A study in Maharashtra suggested that horticultural PV likely can almost double the efficiency measured by the combined output of electricity and agriculture per unit of land.<sup>23</sup> It provides shade and better moisture retention in the dry rabi season. In addition, water channels placed below the PV panels can collect and direct the rainwater falling on panels, which then can be stored in tanks, to be used in dry season.

Water conservation technologies result in better availability of water for cultivation and its proper use. Technologies like sprinkler and drip irrigation are key infrastructure that promote "more crop per drop" of water. Other notable infrastructure, including farm ponds and lined irrigation channels, can retain and harness rainwater for agriculture. Both the public and private sectors have made considerable investments in this area.

<sup>19</sup> Lauren C. Ponisio, Leithen K. M'Gonigle, Kevi C. Mace, Jenny Palomino, Perry de Valpine, and Claire Kremen, "Diversification Practices Reduce Organic to Conventional Yield Gap," *Proceedings of the Royal Society B* 282, no. 1799 (2015), <https://royalsocietypublishing.org/doi/10.1098/rspb.2014.1396>.

<sup>20</sup> *The Farming Systems Trial* (Kutztown, PA: Rodale Institute, 2011), <https://rodaleinstitute.org/wp-content/uploads/fst-30-year-report.pdf>.

<sup>21</sup> Ministry of Agriculture and Farmers Welfare, "Decrease in Agricultural Holdings," 3 March 2020, <https://pib.gov.in/PressReleasePage.aspx?PRID=1605058>.

<sup>22</sup> Statista, "Value of Fertilizers Imported into India from Financial Year 2011 to 2019, with an Estimate for 2020," 2021, <https://www.statista.com/statistics/625203/import-value-of-fertilizer-india/>.

<sup>23</sup> Uma Gupta, "Integrating Agriculture and Solar Energy Production," *pv magazine India*, 27 May 2020, <https://www.pv-magazine-india.com/2020/05/27/integrating-agriculture-and-solar-energy-production/>.

One promising technological development is the extended reach of mobile data coverage to many remote areas, which has acted as a big enabler. Competition among telecom providers has led to low data costs and to the rapid adoption of data-enabled handsets by farmers. This access has led to a significant increase in the range of products and services available to small farmers, including advice on the choice and maintenance of crops, advice on animal husbandry, financing options, and even market access, creating a vibrant AgTech industry.

### 3.3. Consumer Preferences

A shift toward sustainable agriculture may need to be accompanied by changing consumption patterns. The EAT-Lancet Commission on Food, Planet, and Health, a consortium of leading scientists, recommends an increased consumption of plant-based diet as a necessary step towards healthy diets and sustainable food systems. Within this context, an important way to promote resilience can be achieved by increasing the area of cultivation of crops which are climate resilient. Different stakeholders have made concerted efforts to move production from water-intensive crops like rice and wheat to millets (a more climate-resilient crop), but consumer preference and demand has been limited, hampering the desired shift.

Signs are improving, however, of improved consumer consciousness and growing preference in other areas, such as coffee, cotton, cocoa, and other organic ethnic foods grown using sustainable methods.

While consumer preferences and the ability to command a premium may be important drivers, these alone are insufficient to transform the majority of landholding to sustainable agriculture. Most consumers are either unwilling or unable to pay for premium products. Other factors, such as better economics for the farmer driven by fewer inputs, crop resilience to extreme weather resulting from healthy growth fostered by microbially rich soil, or even improved health of farmers due to less exposure to chemicals, all need to work in tandem, as seen in the case of CBNF. Even though no CBNF certification is in place and thus no premium, large tracts of land have been converted to natural farming.

### 3.4. Climate-Resilient Transition by Corporations

The move towards natural agriculture also requires companies involved in the production of fossil-fuel-based inputs, such as fertilisers, to adapt to these changes.

A few fertiliser manufacturers are moving into organic fertilisers, and a few pesticide suppliers are supplying products which support agricultural resilience. One example is soil and water technologies that absorb water during heavy downpours and release

it when plants need it. India has a thriving "bio-stimulant"<sup>24</sup> market composed of both global and local companies, which also are supporting global needs.<sup>25</sup> These products increase the productivity of crops without degrading the soil, leading to healthier crops which can withstand extreme weather conditions.

Finally, carbon pricing and trading have been used successfully for climate transition projects in other areas. While some work has been accomplished<sup>26</sup> on the use of carbon credits to fund the transition, we are still at an early stage of evolution. In Peru, carbon credits have played a supporting role in the transition to natural cocoa farming.<sup>27</sup> Carbon prices are low but increasing, and market participants expect carbon offsets to emerge as a source of nonphilanthropic and nonpublic capital, potentially stimulating the blended finance market.

### 3.5. Demand for Climate-Resilient Farming Practices from Corporations

Sustainable agriculture is similar to infrastructure projects in some ways. Both pay off over the long term and may need some form of financial engineering to manage various risks. Infrastructure projects differ, however, from sustainable agriculture in a key respect: infrastructure projects typically have demand risk taken away from them using, for example, power purchase agreements for utility companies. A similar source of demand for sustainable agriculture would be from corporations which source directly from thousands of farmers, with many companies claiming to follow best environmentally friendly practices in their supply chains.

Our conversations with market practitioners have revealed that their supply chain requirements fall short of what is needed to drive enough demand for sustainable agricultural practices. This shortfall possibly can be linked to the lack of large-scale consumer demand for sustainable produce. Demand is growing from companies that produce goods such as clothing primarily for export. Some brand initiatives also are based on sustainable cropping systems, but this is far from a widespread trend.

<sup>24</sup> Bio-stimulant is referred to as a biological extract or substance and sometimes microorganisms which is used as a supplement to enhance the abiotic stress tolerance, nutrition efficiency, enhance metabolism, water-holding capacity, and production of chlorophyll.

<sup>25</sup> "Biostimulants Market Outlook 2019, Price Trend, Size Estimation, Industry Latest News, Research Report and Global Share Forecast 2023," MarketersMEDIA, 15 January 2019, <https://marketersmedia.com/biostimulants-market-outlook-2019-price-trend-size-estimation-industry-latest-news-research-report-and-global-share-forecast-2023/470798>.

<sup>26</sup> VEDA Climate Change Solutions Ltd., "What We Do," <http://vccslindia.org/>.

<sup>27</sup> Initiative 20x20, "Agroforestry and REDD+ in Peru's Amazon," <https://initiative20x20.org/restoration-projects/agroforestry-and-redd-perus-amazon>.

## 4. Challenges in Scaling Up Financing Climate-Resilient Projects

Tackling climate change, especially in the AFOLU sector, requires large investments and collaboration of multiple stakeholders. No single actor, be it governments, farmers, industry, or financial institutions, can tackle the challenge alone. Moreover, several of the financing challenges are described next.

### 4.1. It's Difficult to Deploy Large Amounts of Capital to Work

Impact projects in general face challenges when it comes to obtaining finance from mainstream investors. First, it is difficult to find organisations that can put a large amount of capital to work, given the prevalence of smallholder farms, as our case studies show. Second, scaling up takes time and focused efforts, which many mainstream financial institutions are unwilling to pursue without adequate financial incentive. Third, although it might be possible to scale up using technology—for example, for farmer outreach—these efforts have yet to be proven on a large scale.

### 4.2. Lack of Appropriate Frameworks to Evaluate Impact Projects

For a long time, impact projects were funded by grants, soft loans, or other forms of aid, using development frameworks few mainstream financial institutions would recognize as robust or quantitative. The organisations that execute impact projects do not always use terminology, such as project term or payback period, nor do they employ people with financial expertise. Even in institutions committed to impact investing, the frameworks to evaluate projects on both impact and financial dimensions in a robust and consistent manner and communicating them to investors have been a work in progress. Within climate-resilient agriculture, the context-specific nature of interventions, the vast variety of crops, variations in agro-ecological zones,<sup>28</sup> and the myriad effects of interventions, ranging from farmer health (due to less exposure to chemicals) and less wastage (effect of cold chains) to income diversification and better soil health, collectively make it difficult to pinpoint a common measure of impact. While we are far from standardised impact measures, frameworks for impact management, such as the nine impact principles,<sup>29</sup> are attempting to bring some degree of consistency to impact funds.

<sup>28</sup> An agro-ecological zone refers to the division of an area of land into smaller units, which have similar characteristics related to land suitability, potential production, and environmental impact.

<sup>29</sup> Operating Principles for Impact Management, "The 9 Principles," <https://www.impactprinciples.org/9-principles>.

### 4.3. Low Awareness of Sustainable Farm Practices Among Farmers

India faces additional challenges. Indian agriculture is highly fragmented as evidenced by the fact that average farmholding size was just 1.08 hectare in 2015–2016.<sup>30</sup> The priority is to generate awareness around climate-resilient farm practices to create sufficient demand. It is not enough to answer the question how climate-resilient agriculture benefits the environment, but rather to explain how it benefits the farmer and demonstrate why consumers should prefer the same.

### 4.4. Uncertainty Around Long Gestation Periods

The sustainable agriculture projects, especially in the area of agroforestry,<sup>31</sup> have long gestation periods and are inherently risky. While financial institutions fund infrastructure projects with long gestation periods, infrastructure projects clearly have financial risk mitigation in the form of control over cash flows or underlying assets. The assets underpinning sustainable agriculture projects, mainly the underlying holdings, belong to the farmer and are difficult to collateralise, and banks are reluctant to take on the risk.

### 4.5. Central Banks Do Not Account for Climate-Related Risks in Their Computation of Risk Weights or Stress Tests

In their role as supervisors, central banks have to ensure that banks are monitoring and managing different commercial risks. Climate change is an important source of risk for banking systems. Central banks are considering how to incorporate climate-related risks in their analysis and policy interventions. In a Central Banking survey conducted in 2019, 64% of the 34 respondents said climate change is a concern they were closely monitoring, and 21% viewed climate change as a significant threat to financial stability.<sup>32</sup> All but one respondent did not account for climate-related risks in their stress tests, although 59% of respondents are looking to implement climate-related scenario analysis as part of their stress tests. A whopping 94% of the central banks said they are ill-equipped to promote greener economic system because they lack the necessary tools. The Reserve Bank of India recently joined the international Network for Greening of the Financial

<sup>30</sup> Ministry of Agriculture and Farmers Welfare, "Decrease in Agricultural Holdings."

<sup>31</sup> A practice in which trees and shrubs are used as land management system in a farm to control soil erosion.

<sup>32</sup> Central Banking, "Climate Change Focus Report," 2019, <https://www.centralbanking.com/content-hub/climate-change-focus-report-2019-4250986>.

System, which has developed a standardised set of climate scenarios for central banks to use.<sup>33</sup>

Because banks are the main source of financing agriculture, the lack of discrimination between the status quo and climate-resilient agriculture creates obstacles in scaling up the latter.

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<sup>33</sup> "RBI joins Network for Greening the Financial System," RBI press release, 29 April 2021, [https://www.rbi.org.in/Scripts/BS\\_PressReleaseDisplay.aspx?prid=51496](https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=51496).

# 5. Models for Financing Climate-Resilient Agriculture

Historically, financing for climate-resilient agriculture has come from public sources, including governments and states, multilateral development institutions, or national and state development finance institutions (DFIs). The traditional instruments used to deploy climate finance include grants, concessional loans, guarantees, and ultra-long-term equity, which cap returns at the project level.<sup>34</sup>

However, in response to the challenges in attracting private capital in sustainable agriculture projects, and the rapid pace of climate change, public sources may not be sufficient, and various alternative financing models to attract private capital have been devised. By combining traditional instruments with risk sharing–risk mitigation mechanisms, it is possible to create an appealing risk–return profile for investors, which in turn would catalyse private sector participation ("crowding in"). The primary avenue is blended finance,<sup>35</sup> which we discuss at length in our first case study "Rabo Foundation/ USAID Portfolio Guarantees."

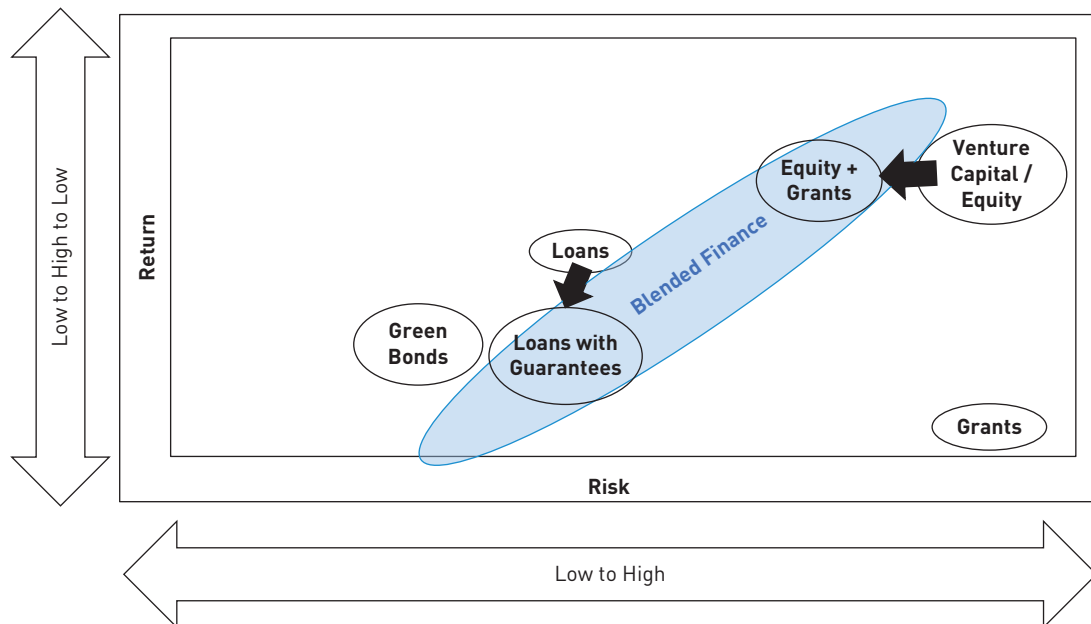
Chart 1 shows the return–risk profiles of various financial instruments used in climate finance, from the perspective of return-seeking investors. While investors must consider risk and return in combination with impact, this chart illustrates the effect of financial engineering on improving the return–risk profile for the investors who otherwise would not participate in this area.

For example, providing a first-loss guarantee for sustainable finance loans reduces the risk substantially for participating financial institutions, for only a marginal reduction in returns. Similarly, supplementing VC projects with grants (including technical assistance, such as feasibility studies) during the early stages substantially improves project viability and improves the return–risk profile for commercial investors. Green bonds are one of the best avenues for funding sustainable projects, given the increasing availability of international capital. As we will see, however, it is substantially geared towards climate mitigation projects in specific sectors.

Let us consider three financing models: blended finance, green and social bonds, and VC.

<sup>34</sup> World Bank, "Making Climate Finance Work in Agriculture" (World Bank, Washington, DC, 2016), <http://documents1.worldbank.org/curated/en/986961467721999165/pdf/ACS19080-REVISED-OU0-9-Making-Climate-Finance-Work-in-Agriculture-Final-Version.pdf>.

<sup>35</sup> Blended finance is the strategic use of development finance for the mobilisation of additional finance towards sustainable development mostly in developing countries

Chart 1. Return–Risk Profiles of Various Climate Finance Instruments<sup>36</sup>

## 5.1. Blended Finance

The term "blended finance" has become popular in recent years as donors and philanthropists have recognized the increasing need to attract private capital to address development objectives. The OECD defines blended finance as the "strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries."<sup>37</sup> Blending public sources works best when the perceived risks in the market are higher than actual risks and when necessary to demonstrate commercial viability. It is also useful when the development impacts are gained over longer time horizons than what the investors are used to.<sup>38</sup>

### Features of Blended Finance Transactions

According to the OECD, blended finance transactions have the following features.<sup>39</sup>

- Blended finance is a way of raising resources to achieve development outcomes and impact.

<sup>36</sup> For illustrative purposes only.

<sup>37</sup> OECD, "Blended Finance: Unlocking Commercial Finance for the Sustainable Development Goals," <https://www.oecd.org/dac/financing-sustainable-development/blended-finance-principles/>.

<sup>38</sup> World Bank, "Making Climate Finance Work in Agriculture," 11.

<sup>39</sup> OECD, "Making Blended Finance Work for Sustainable Development Goals" (OECD, Paris, 2018), [https://read.oecd-ilibrary.org/development/making-blended-finance-work-for-the-sustainable-development-goals\\_9789264288768-en#page1](https://read.oecd-ilibrary.org/development/making-blended-finance-work-for-the-sustainable-development-goals_9789264288768-en#page1).



- Blended finance is about attracting additional nondevelopment financing. Additional financing refers primarily to commercial finance that is not currently deployed to support development outcomes.
- Blended finance represents a shift from financing private sector to mobilising private finance
- Blended finance combines mobilisation at the transaction level with a catalytic ambition over time.

Mobilisation—in which case there is a direct causation between one form of financing unlocking another—is a basic feature of blended finance. In the overall development context, however, blended finance is often deployed because of an expected catalytic effect, including through demonstration effects and accelerated market evolution.

### *Blended Finance Market Landscape*

According to the OECD, between 2012 and 2018, a total of \$205 billion was mobilised from the private sector by official development finance interventions, and the data show a significant upward trend over the period.<sup>40</sup> The bulk of the financing went to the energy and financial sectors, however, and only a small portion was accounted for by the agriculture and social sectors. For example, in 2017–2018, energy and financial services accounted for 56% of the \$43 billion of private capital mobilised, whereas agriculture accounted for just 3.3%.<sup>41</sup>

According to Convergence, a database tracking blended finance transactions in emerging countries, only 15% of the 569 transactions (88) focus on agriculture, far less than other sectors.<sup>42</sup> The median transaction sizes are also smaller than other sectors, with 38 transactions (43%) less than \$25 million in size, and only four transactions in excess of \$200 million. By contrast, roughly half the transactions in the overall database were more than \$50 million in size, and 17% of the transactions were more than \$250 million in size. Although blending can occur at the project level or at the portfolio level, given the small scale of project-level transactions (less than \$500,000 size), few transactions are made at this level.<sup>43</sup>

### *Types of Blended Finance Instruments*

Following are types of blended finance instruments:

- Grants—these include technical assistance for projects, and viability gap funding in blended finance projects, or performance-based incentive payments.

<sup>40</sup> OECD, "Amounts Mobilised from the Private Sector for Development" <https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/mobilisation.htm>

<sup>41</sup> OECD, "Amounts Mobilised from the Private Sector for Development"

<sup>42</sup> Convergence, "Deploying Blended Finance to Mobilize Investment at Scale in Food and Agriculture," March 2021, [https://5724c05e-8e16-4a51-a320-65710d75ed23.filesusr.com/ugd/e03597\\_f3903ab8490244a4a87a66bdbe09b7ff.pdf](https://5724c05e-8e16-4a51-a320-65710d75ed23.filesusr.com/ugd/e03597_f3903ab8490244a4a87a66bdbe09b7ff.pdf).

<sup>43</sup> Convergence, "Deploying Blended Finance to Mobilize Investment."

- Concessional equity instruments—these include subordinated, first loss, or junior equity capital, in which the donor accepts a high risk for relatively low return.
- Debt instruments—these include senior debt or subordinated debt at concessional terms (with interest rates below market level or tenors provided longer than what is available in the market).
- Credit enhancement mechanisms—these include guarantees and insurance, which are useful instruments for mitigating risks for commercial investors and can be categorised as follows:
  - Partial risk guarantees (PRGs), which are instruments tailored to counter-guaranteeing government and other public sector obligations in a public-private partnership;
  - Partial credit guarantees, which guarantee nonpayment by the borrower on the guaranteed portion of the principal and interest due;
  - Guarantees that cover against losses arising from foreign exchange risk; and
  - Insurance instruments, such as political risk insurance.

In India, one of the most well-established and institutionalised blended finance mechanisms is the viability gap funding (VGF) run by the government of India.<sup>44</sup> In one scheme in which the issue is poor revenue streams and bankability (sectors such as wastewater treatment and solid waste management), projects that can cover their operational costs in full are eligible for 30% of their total project costs as VGF. In another scheme which supports demonstration and pilot projects in health and education sectors, those projects that can cover at least 50% of their operational costs are eligible for 80% of their capital expenditure and for 50% of their operational costs as part of VGF. In agriculture, the 2020 budget proposed the creation of an additional storage infrastructure through a VGF mechanism following a public-private partnership model.<sup>45</sup>

Such blending enables investments in sectors and industries that have not had private capital because of the high cost of capital. Other instruments have been made available, wherein certain transaction costs have been met by grants or guarantees have been provided at submarket rates, in sectors in which market players do not understand the risks involved.

Another blended finance approach (i.e., guarantees) can provide banks and investors with a secondary level of comfort that the investment will be repaid if the obligor is not

<sup>44</sup> Ministry of Finance, "Cabinet Approves Continuation and Revamping of the Scheme for Financial Support to Public Private Partnerships in Infrastructure Viability Gap Funding VGF Scheme," PIB Delhi, 11 November 2020, <https://pib.gov.in/PressReleasePage.aspx?PRID=1671914>.

<sup>45</sup> Ministry of Finance, "16 Action Points to Focus on Farmer's Income, Storage, Blue Economy and Animal Husbandry," PIB Delhi, 1 February 2020, <https://pib.gov.in/PressReleasePage.aspx?PRID=1601455>.

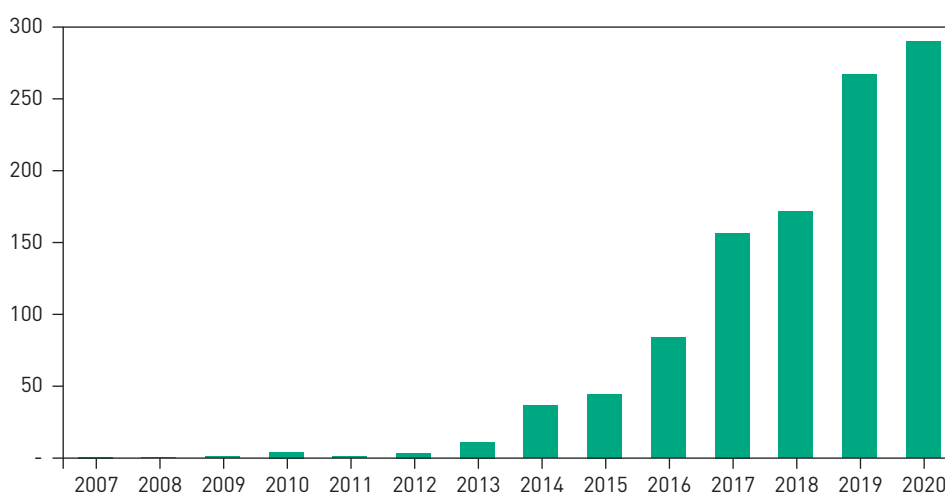
able to make payments. Thus, it can lower risk for lenders and ensure an appropriate risk-adjusted return to the project. According to the Convergence database, 28% of historical blended finance transactions in agriculture make use of guarantees or insurance, and scope exists for their increased use.<sup>46</sup> The first case study on the Rabo Foundation and the US Agency for International Development (USAID) provides an example of portfolio guarantees to mobilise private capital. This study, and Villgro's operating model, illustrate how blended finance works in practice.

## 5.2. Green Bonds, Social Bonds, and Other Labelled Debt Instruments

Green bonds are like traditional bonds (tradable debt instruments), but their use of proceeds is earmarked for "green projects" or green causes. Since its debut nearly a decade ago, issuances have grown impressively over the years, as illustrated in chart 2, with cumulative issuance exceeding \$1 trillion in 2020.

Increasing commitment from global investors to environmental causes is driving greater competition for green bonds compared with the plain-vanilla equivalents. This increased competition in turn has resulted in a "greenium" or better pricing of green bonds compared with their plain-vanilla equivalents. Many Indian financial institutions and renewable energy developers have issued green bonds, with a vast majority of them being offshore, to take advantage of dedicated green capital.

**Chart 2. Green Bond Issuances Over Time (US\$ billions)**



Source: Climate Bonds Initiative.

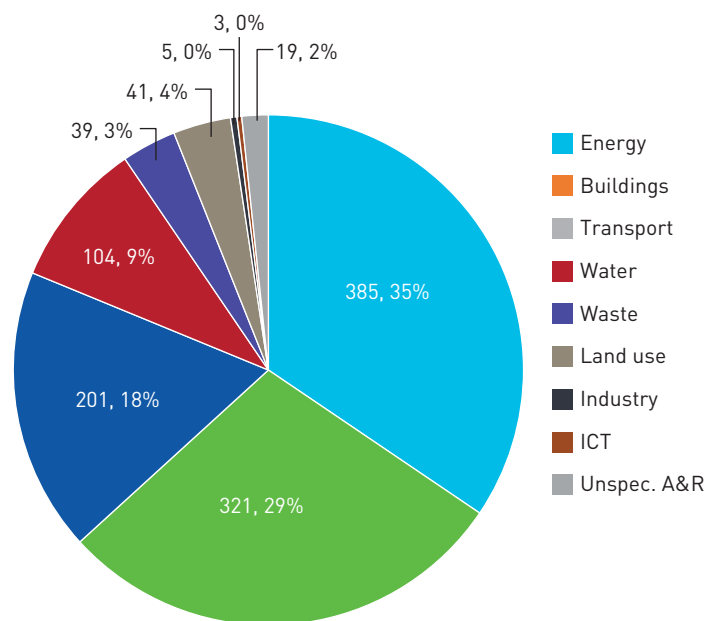
<sup>46</sup> Convergence, "Deploying Blended Finance to Mobilize Investment."

Chart 3 shows the division of green bond issuance by use of proceeds. Buildings, energy, and transport account for 72% of all issuances. This division can be explained partly by the fact that some of these sectors traditionally have accounted for a large proportion of the traditional financial system (buildings), and they have seen tremendous growth because of policy thrusts and increasing financial attractiveness of the segments, especially renewable energy. Green issuance towards sustainable land use sector has been modest. Although some financing activity is being directed towards maintaining forests by paper and pulp manufacturers, a large portion of financing has been focused on plastics in the packaging of agricultural produce. Activity in the supply chains, while increasing, has been slow and sporadic until now.

In South Asia, given the dominance of smallholder farmers and periodic instances of farm distress, the social development aspects are equally, if not more, important than climate resilience. In this context, in addition to green bonds, social bonds (for which the use of proceeds is dedicated to social causes) can be powerful instruments, especially when the terms of financing like interest rates can be linked to social development targets. While the social bond issuance has been growing, further scaling up and fine-tuning of the structure will be necessary to address the social issues.

The case study "Symbiotics/Samunnati Social Bonds" illustrates how social bonds are structured in this space.

**Chart 3. Cumulative Issuance by Use of Proceeds (US\$ billions)**



Source: Climate Bonds Initiative.

Other debt instruments that have the potential to catalyse action in this space include sustainability linked bonds, which generally do not place restrictions on the use of proceeds. The coupon/interest payment is structured in a manner, however, that lowers the payout if sustainability linked targets are met. Somewhat similar, but generally available on a much smaller scale, are social impact bonds, wherein philanthropic capital kicks in to reduce the effective borrowing rate when certain key performance indicators (KPIs) are met. These instruments have made their debut through the tradable instruments (i.e., bonds), but a market for loans with these labels and features is also developing.

## 5.3. Venture Capital and Indian Agriculture Technology (AgTech) Sector

### *Background*

Innovations in technologies, advice, and business models are critical for achieving climate resilience and scale. Disruptive models tend to be high risk for traditional capital providers but are well-suited for VC funds.

India is one of the largest agriculture producers in the world across a variety of crops, but as we have described, it faces significant supply-side challenges. VC investments in the AgTech sector have been rising in recent years, driven by the increasing adoption of data-enabled handsets by farmers, low costs and competition in the telecom sector, a dynamic VC and technology sector, and fragmentation in supply chains that offer potentially lucrative technological wins.

### *Definition and Types of AgTech*

AgTech is defined as a segment of companies using technology in the field of agriculture leading to increase in productivity, efficiency, and output. AgTech can be applied across the agricultural value chain and can be in the form of a product, a service, or an application.

A uniform taxonomy does not exist for AgTech companies. Following are some of the major types of AgTech companies.<sup>47</sup> This list is not exhaustive.

- Plant science: Modification of existing plants and organisms, including genetic modification, for better plant health and yields.
- Crop protection and input management: The development of products and technologies that when applied improve plant yield, including the development of synthetic and

<sup>47</sup> Finistere Ventures, "2020 Agrifood Tech Investment Review," 2020, <https://finistere.com/wp-content/uploads/2021/04/Finistere-Ventures-2020-Agrifood-Tech-Investment-Review.pdf>.

natural active ingredients, biologicals, and other ingredients to improve plant and soil health. The first two bullets are sometimes combined under the AgBiotech category.

- Precision agriculture (PrecisionAg): Software suite, data management, and analytical tools for better farm management, typically with user-friendly mobile applications.
- Agriculture marketplace and fintech: Online marketplaces for trading, buying, and selling agricultural goods, as well as platforms for managing the financial transactions and administration.
- Indoor agriculture: Production of turnkey software and hardware systems for cultivation of crops within buildings.
- Sensors and smart farm equipment: Hardware and software to monitor a range of conditions frequently in proximity, with integrative capability with whole platforms.
- Imagery: Equipment, software, and hardware systems plus actual manufacturing of drones for aerial monitoring.

### AgTech Landscape

Over the past few years, the presence of AgTechs in India has increased quite sharply. According to ThinkAg, an Indian food and AgTech platform, the 600 AgTech start-ups that were active in 2020 have received cumulative capital flows of \$1.9 billion since 2010<sup>48</sup> and represent around 12% of cumulative global investments over the period.<sup>49</sup> The capital investments have grown by an impressive 48% (annualised) between 2014 and 2019. Among investors are VCs dedicated to AgTech (including the market leader), generalist VCs, and some corporates with strategic overlap with their operations. Not too many companies have exited this space, but some of these companies have been in the business for close to a decade and operate in several states, raising hopes of sustainability and potential for scaling up, and thus profitable exits (see table 2).

Growth in investment value, however, has not translated to unique deals. Of the 64 deals completed in 2019, only 9 were new and unique, and the rest were follow-on funding from earlier years.<sup>50</sup> A lot of these follow-on deals have small ticket sizes of less than \$1 million, indicating gap funding, and it is possible that start-ups are taking longer to reach the metrics investors expect for deploying large amounts of capital. Additionally, most of the investments are going into marketplaces and fintech categories, which are software intensive, whereas investments in AgBiotech, which requires research and development (R&D) expertise, is absent. India also lacks strategic investors, like Bayer and Syngenta, which dominate AgTech investments globally.<sup>51</sup>

<sup>48</sup> ThinkAg, "AgTech in India—Investment Landscape Report," <https://bit.ly/thinkag-report2020>.

<sup>49</sup> Finistere Ventures, "2020 Agrifood Tech Investment Review," and CFA Institute calculations.

<sup>50</sup> ThinkAg, "AgTech in India—Investment Landscape Report."

<sup>51</sup> ThinkAg, "AgTech in India—Investment Landscape Report."

Even specialised and mature VC funds are rarely equipped to fully support the process of funding the R&D, testing, refinement, and eventual roll-out of new models. For India to incentivise R&D and experimental innovations, blended finance solutions are needed in the VC space.

In the Villgro case study, one of the incubators specializing in social enterprises, including agriculture, we describe its approach for selecting AgTech investments and financing through various stages and using blended finance as needed.

**Table 2. Select AgTech Companies and How Their Activities Address Climate Resilience**

No.	Name of Company	Description of Operation	How They Address Climate Resilience
1	INI Farms	Provides advisory services to fruit farmers and subsequently helps the farmer in following that advice and monitors the crops and then exports the produce. Following this advice makes the fruits eligible for export, specifically in terms of the presence of chemicals. It also works on supply chain automation, improving postharvest efficiency and reducing wastage. Services provided postharvesting include packhouses, cold storage, and ripening centres.	Adherence to standards mean reduced use of and elimination of the use of chemicals, restoring soil health, and making plants and trees sturdier. Storage and logistics protect farm produce from extreme weather conditions.
2	Ecozen	Provides cold storage facilities (powered by distributed renewable energy, overcoming Issues of poor power supply) and final delivery to the buyer through vehicles with cold storages.	Protecting produce from extreme weather conditions. Give the farmer leverage to sell produce when prices are right.
3	Bharat Agri	Provides advisory services to farmers on growing crops based on an algorithm that takes into account among other things climate variation in the past 15 years, including soil conditions.	Crops produced suited to weather patterns and soil conditions.
4	Farmguru	Provides specialised and scientifically developed inputs like high-yield, drought-friendly seeds varieties, and related advisory for cattle fodder and forages.	Cultivation of drought-resistant fodder. Advisory service on cultivation leads to sturdier weather resistant crops.
5	DeHaat	Provides crop advisory services and dis-intermediated access to market.	Crops grown with scientific Inputs are likely to be healthier and more resistant to extreme weather. Dis-intermediated market access leaves the farmer in a better financial condition.

# 6. Call to Action

## 6.1. Develop a Taxonomy for Sustainable Agriculture

Sustainable agriculture is known by many terms in India. In addition to the well-known CBNF, other popular terms are Jaivik Kheti, Sahaj Kheti, Sajeev Kheti, Yogic Kheti, Ahimsa Farming, Homa Farming, and Gou Aadharit kheti, to name a few.<sup>52</sup>

Other sustainable agriculture systems focus on increasing farm productivity by increasing diversification, increasing resource integration, and creating market linkages.

Although climate resilience is highly context driven, certain crops like bamboo and millets also might be included, based on their lower water requirements. These and other various types of farming practices need to be catalogued and compared on a consistent basis and their performance must be calibrated against the local climatic threat. In other words, a consistent and comparable taxonomy of measures needs to be calibrated against the physical risks from climate change. This approach would constitute "sustainable agriculture."

Parties to take action include National Bank for Agriculture and Rural Development, the Ministry of Agriculture of the Union Government, and the Indian Council for Agricultural Research.

## 6.2. Address Training and Capacity Needs of Stakeholders

In section 2, we discussed the "hardware" aspects of climate-resilient agriculture, namely, infrastructure, technologies, and products. This hardware, however, needs to be complemented by the "software," that is, the ability to address training and capacity needs and to expand the knowledge base of farmers. Financial institutions need to train their workforce not only about how to conduct due diligence on sustainable agriculture projects but also about how to track outcomes and demonstrate the social impact of their financing.

Parties to take action include Banker's Institute of Rural Development, philanthropies that work with farmer producer organisations (FPOs), and various Krishi Vigyan Kendra.

<sup>52</sup> Centre for Science and Environment, "State of Organic and Natural Farming in India: Challenges and Possibilities," 8 September 2020, <https://www.cseindia.org/state-of-organic-and-natural-farming-in-india-10346>.



## 6.3. Provide State Government Support for Basic Research in Climate-Resilient Agriculture

Several Indian states have taken a lead in supporting sustainable agriculture. Given that agriculture is a state subject in India, a case can be made for others to follow suit, in terms of setting up accelerators for AgTech start-ups; working with multilateral agencies for capacity building, such as large-scale training of farmers on sustainable practices; and blended finance through state development institutions.

State governments can sponsor additional research, especially long-horizon studies, on the benefits of sustainable agriculture practices compared with conventional methods, to enable greater adoption among institutions and FPOs. Nongovernmental organisations have played a vital role in Indian agriculture,<sup>53</sup> and they can be the agents that carry out and disseminate some of this research, with the help of government funding.

Parties to take action include the Ministry of Agriculture of State Governments.

## 6.4. Leverage Data and Technology to Increase Formalisation of AgTech Sector

In section 2, we discussed how low data costs is creating a vibrant AgTech sector. The next step is to leverage the innovations in this sector to increase the degree of formalisation and maturity of the sector.

A reason for low levels of bank lending is that many farmers are not connected to formal systems, and they lack a transaction and information trail of any sort. If AgTech firms that engage with farmers are allowed to share data with banks, it could lead to a virtuous cycle of better credit evaluation, lower risk and cost of loans, and more financing, thus creating additional demand from farmers for AgTech and other services and, in turn, generating more transactions.

For example, certain AgTech firms, which dispense advisory services based on biochemical inputs, also monitor whether the advice is being followed and buy the produce thus cultivated. If such information is shared with financial institutions, it can improve their lending decisions and incentivise farmers to adhere to scientifically curated advice.

Parties to take action include mainstream banks.

<sup>53</sup> "NGOs Helping Indian Farmers," *Borgen*, 11 March 2020, <https://www.borgenmagazine.com/ngos-helping-indian-farmers/>.

# 7. Case Studies

## 7.1. Rabo Foundation/USAID Portfolio Guarantees

### Overview

The government of India, along with like-minded international and national agencies, is framing suitable policies for development and promotion of the sustainable landscapes sector, but access to finance at various points in the value chain is not easily available from mainstream financial institutions.

To encourage lending to this sector, in September 2018, Rabo Foundation and USAID collaborated with financial institutions by providing them with structured portfolio guarantees (initial facility size was \$15 million, to be ramped up as needed) to enable them to give loans in the sustainable landscapes sector (called the "Sustainable Landscape Guarantee Programme"). While the USAID has technical expertise in sustainable landscapes sector, Rabo Foundation has a long history of working with smallholder farmers around the world. By providing these loan guarantees, the partnership enables financial institutions to originate loans efficiently through their local branches; otherwise, they would not have done so because of the high perceived risk or lack of knowledge (chart 4).

The goal of this blended approach for financing is twofold: (1) to create a demonstration effect in the market, showing other financial institutions that the sustainable landscapes sector is financially viable, and (2) to increase the support for projects in the sustainable landscape sector to slow, halt, and whenever possible, reverse GHG emission from land use.

### Financial Institutions

As part of the Sustainable Landscape Guarantee Programme, two local financial institutions, Ananya Finance for Inclusive Growth Private Ltd. and Samunnati Financial

Chart 4. Rabo Foundation/USAID Process for Identifying Local Partners



Approached mainstream financial institutions for financing sustainable landscapes with portfolio guarantees



Showcased Similar Programs Conducted by institutions to catalyse interest



Signed a pilot deal with Two Small Impact Focussed Financial Institutions with a First Loss Guarantee upto \$15mn

Intermediation and Services Private Limited, invested over the first few months of the program and developed a pipeline by engaging with relevant stakeholders. At the timing of writing, both financial institutions together have identified a number of borrower beneficiaries and plan to fully disburse the total loan amount through 2021.

### *Ananya Finance for Inclusive Growth Private Limited*

Ananya Finance for Inclusive Growth Private Ltd. ("Ananya") is a socially motivated for-profit NBFC that extends loans and technical assistance to microfinance institutions (MFIs), especially small and midsize MFIs that are in a growth stage. It is also a lender to growth-stage FPOs and impact micro, small, and midsize enterprises (MSMEs) in the renewable energy, waste management, affordable health, and livelihoods space.

### *The Problem Statement*

Small farmers make up the largest percentage of farmholdings at an estimated 78%. Their contribution to national food production is estimated to be around 41% and they own about 33% of the cultivated land.<sup>54</sup> Thus, despite their low productivity, their contribution to household food security and poverty alleviation is quite significant. Also, small and marginal farmers account for more than half of India's vulnerable and excluded population. They face the following constraints: (1) poor access to credit; (2) poor access to critical inputs, such as water, power, seeds, and fertilisers and manure; (3) limited market access; and (4) high production risk and little insurance coverage.

This reality drives the need for intervention by NBFCs like Ananya, most notably, to address the primary constraint of poor access to credit. With access to credit, the farmers, through their collectives, can address other issues.

Upon exploring the financing opportunities in agriculture, Ananya realised that strong demand existed for various financing opportunities in the entire agricultural value chain. Ananya started the agribusiness finance activities in early 2015 and has been the first lender to many borrowers in the agri-finance vertical space. Most of these beneficiaries are located at smaller locations, have almost no credit history, and do not fit into the rigid lending policies set by the mainstream financial institutions. Mainstream financial institutions are generally risk averse when it comes to farm loans and tend to lend only against hard collateral like warehouse financing.

Farmers face many of the risks inherent to business enterprises, including market risk (price volatility risk) and a high dependence on suppliers. To manage these risks, farmer entrepreneurs need to have a better access to markets. Currently, there is a lot

<sup>54</sup> R. B. Singh, T. Kumar, and T. Woodhead, "Smallholder Farmers in India, Food Security and Agricultural Policy," (FAO, Bangkok, March 2002), [https://coin.fao.org/coin-static/cms/media/9/13170962616430/2002\\_03\\_high.pdf](https://coin.fao.org/coin-static/cms/media/9/13170962616430/2002_03_high.pdf).

of information asymmetry between buyers and sellers. Farmers also lack awareness on how they can add value, and in some cases, they lack basic financial literacy. For example, farmers tend to hold produce for three to four months, and the poor inventory management results in wastage, inefficiencies, and fire sales. In this regard, Ananya engages in capacity building in collaboration with organisations like the International Finance Corporation, in the areas of governance, risk assessment, bookkeeping, and information technology.

### *Sustainable Landscape Guarantee Program*

Ananya Finance understands that agriculture has contributed significantly to climate change and volunteered to partner in this program, which will be a 10-year association to provide \$3 million in financial support in the form of a guarantee to create a sustainable landscape. Ananya already has provided financial assistance to the extent of 20% of the required financial support. The main objective of providing the assistance is to support organisations that work to slow, halt, and, where possible, reverse GHG emissions from sustainable land use. The idea was to channel commercial loans to the sustainable landscapes sector (see the example in box 1).

Support has been extended to the following types of projects:

- Making biodegradable dinnerware from Arecanut trees sheaths in Assam (these are substitutes to plastic and polystyrene foam-based plates, which are not environment friendly).
- Plantation of lemongrass on fallow land.
- Gathering honey from forest sustainably.

Under this blended finance approach, Rabo Foundation will provide a first-loss guarantee and USAID would be the second guarantor. The guarantee is available for about half of the principal outstanding. To prevent moral hazard, the borrowers would not be told if their loan qualified under the program.

Apart from working under this program, Ananya is proactively supporting organisations that are working toward lowering carbon dioxide emission. In the past couple of years, Ananya has extended funds to enterprises that have contributed to carbon dioxide emission savings of approximately 10,000 tonnes.

As the program progresses, USAID and Rabo Foundation may involve consultants to evaluate the impact of the programme along with a reduction and reversal of GHG emissions through tools developed in-house.

### Box 1. Sustainable Honey Collection

One of Ananya's three beneficiary borrowers is an enterprise involved in the collection of honey (a nontimber forest product) through an environmentally friendly business model. Traditionally, honey collectors/extractors (generally belonging to forest-dwelling communities) create smoke to scare bees from their hive. This practice causes pollution and increases the danger of accidentally igniting forest fires. It has a negative impact not only on bees but also on the larger forest ecosystem. Other harvesters would cut off the whole hive from the branch, instead of extracting just a slice of the honeycomb, or would chop down the entire tree to attain the hive.

This enterprise developed a scientific, sustainable, and smoke-free method, whereby harvesters locate wild beehives during the day and then return at night, when bees are naturally more docile, to harvest honey. Harvesters cut away just the top portion of the hive, ensuring that it remains a renewable resource—the hive takes about 15 to 20 days to regenerate—and is ready to be harvested once again. The absence of smoke ensures that forests are not damaged as a result of accidental forest fires.

Given the uncertainty, risks, and limited scale, financial institutions are reluctant to meet the credit requirements of such businesses. The sustainable landscapes guarantee product is developed precisely to support such businesses that are having a positive impact on the environment.

### *Samunnati Financial Intermediation and Services Private Limited*

Samunnati Financial Intermediation and Services Private Limited ("Samunnati") was incorporated 2014 as a private limited company and was registered as an NBFC with the Reserve Bank of India in 2016.

### *Sustainable Landscape Guarantee Program*

Samunnati, Rabo Foundation, and USAID have entered into a joint memorandum of understanding by means of which lending to some enterprises and activities results in better usage of forest resources or greener cover and creates sustainable landscapes. A portfolio guarantee scheme can be availed for the purpose of sustainably changing land use, which guarantees about half of the principal outstanding. The initial limit set for Samunnati was \$5 million, out of which about 35% had been utilised by August 2020.

The guarantee enabled lending to the following types of activities:

- Sustainable harvesting of nontimber forest products like tamarind, lac, chironjee, bamboo shoots, or honey by FPOs. The corporate body to whom the loan disbursement has been made establishes some market linkages and avails of a working capital loan.
- Planting of trees like Casuarina, Asoka, and Babul, which take about three to five years to mature, and in the meantime, helping with some intercropping like millets, pulses, and vegetables that are shade friendly.
- Lending to enterprises like Kheyti, which sell and enable Poly Houses (which are shade providers), enables some crops that are shade friendly to be produced with fewer resources (e.g., water intensity). The lending is also to FPOs that then enable the farmer to buy the application.
- Promoting sugarcane crops that use less water, use less fertiliser, and have better harvesting practice, yield management and suitable use of the residue after extraction of the sugarcane juice is extracted and prevent stubble burning. These activities are promoted and enabled by Nubesol. The lending is to FPOs that then enables farmers to do the same. In addition to the noted assets, there were about 30 more prospective proposals as of December 2020, the disbursement of which should take the utilisation of the guarantee facility to 50%.

Until now, lending under this scheme has been to corporates or companies, mostly start-ups, and FPOs. The value Samunnati provides comes from their working capital solutions, working with self-help groups in places like Nilgiris and Forests of Jharkhand to teach sustainable farm practices, and from market linkages.

### *Impact Assessment at Samunnati*

In addition to projects that use the guarantee scheme developed by Rabo Foundation and USAID, Samunnati has been working with FPOs that are actively following sustainable production and business practices. Samunnati uses an impact assessment tool to assess the impact of the business or FPO on the environment and to gauge their sustainable agricultural practices. Samunnati has a scorecard that incorporates things like soil health, including soil degradation, optimum water use, presence of water table replenishment technologies (like check dams), reduced wastage, and use of solar energy. Soil health would encompass practices, such as reduced chemical fertiliser application and reduced chemical pesticide usage.

Samunnati also looks at the use of crops like pulses and millets. Millets are hardy crops that can grow in a relatively lesser amount of water and pulses often help with nitrogen fixing.

## Lessons Learned

Historically, it has been observed that most mainstream banks are reluctant to finance uncollateralised loans. As most of the loans originating from the sector are expected to be uncollateralised, the program was limited to NBFCs that are mission aligned and have products to finance uncollateralised loans.

Planting new trees for agroforestry and afforestation are long-term projects that require long-term financing. The partner financial institutions in the program usually have access to short- and medium-term liquidity, which makes it difficult for them to take long-term exposure. Plus, given the relative high cost of lending of such financial institutions (i.e., banks), it might not be possible to service debt for long-term loans at such higher rates.

The development world is increasingly moving away from grant-based support to semi-commercial support with clear impact KPIs. One way to achieve this is to facilitate working capital and term loans required by impact-oriented businesses. Development agencies find it difficult to channel their support to businesses in India because of restrictive foreign-lending guidelines. Thus, converting development support to credit guarantees to enable lending through local financial institutions seems to be an effective solution for the sector. The agencies not only help businesses access credit without making any market disruptions but also help local financial institutions build capacities to lend in unexplored and riskier sectors.

From this experience, it will be hard to encourage private investment in this sector without leveraging the expertise of the development sector. Through combined expertise, USAID and Rabo Foundation were able to bring different partners to the table to add a focus and develop an approach that provides for incentives private sector lending in the forestry sector. More of these types of collaborations, however, would be required to achieve impact at scale.

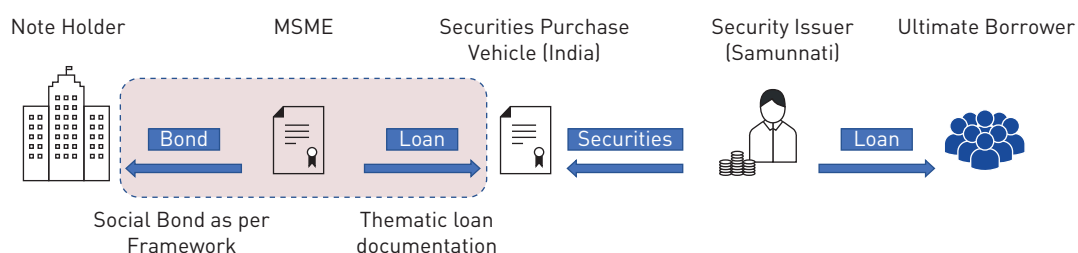
## 7.2. Symbiotics/Samunnati Social Bonds

In August 2020, Symbiotics arranged a new social bond for Samunnati, raising Rs 506.2 million (US\$6.75 million) in local currency debt. Symbiotics has an on-going relationship with Samunnati since 2016.

Samunnati will use the funds to provide loans up to \$10,000 to FPOs, smallholder farmers, and agricultural enterprises. Given Samunnati's focus on climate-resilient agriculture, it is highly likely that this portfolio has some lending to assets that enable climate-resilient agriculture.

This social bond issuance is an example of how specialised agricultural lenders or lenders with specialised portfolios in India or other emerging countries can gain access to thematic

Chart 5. Structure in Which Funds Were Raised



bond issuances on international debt capital markets. The framework used to evaluate the social nature of the use of proceeds are the social bond principles as set by International Capital Markets Association. The bond was issued through the Symbiotics-sponsored bond issuance platform (Micro, Small & Medium Enterprises Bonds S.A.) under its Sustainability, Social, and Green Bond Framework, which was certified by Det Norske Veritas (DNV) GL in December 2019. It has also been listed on the Luxembourg Green Exchange. The social bond proceeds are fully used towards a three-year, senior-secured, nonconvertible debenture to Samunnati. The structure in which the funds were raised is depicted in chart 5.

With the assistance of Symbiotics, lenders like Samunnati can now raise funds through the issuance of sustainability, social, or green bonds without needing to devote significant time and effort to labelling activities. The symbiotics platform provides a ready-to-use labelling mechanism which obviates the need to develop a framework or to obtain a second-party opinion or external certification. Of course, as the asset manager, Symbiotics is the investor on behalf of many of its patrons who entrust Symbiotics as a specialised asset manager to manage part of their portfolio. This platform effectively lowers the hurdle to enter the thematic bond issuance market for relatively small issuances. These issuances specifically include transactions for which such administrative and management effort for labelling might be difficult to spare.

While this transaction did not refinance any of the Rabo Foundation- and USAID-guaranteed portfolio (the guarantee facility was described in the first case study) on Samunnati's books, it provides an example of how capital market linkage can be established for climate-resilient agriculture.

### 7.3. Villgro: Incubator and VC Specializing in Social Enterprises Including Agriculture

Villgro was founded in 2001 to create impactful, innovative, and successful social enterprises, including agriculture. As per the need of the venture, it infuses equity and also



distributes grants. This "blended approach" of grants and equity has been tried and tested with many reputed donors supporting this activity.

### Selecting the Right Enterprise to Support

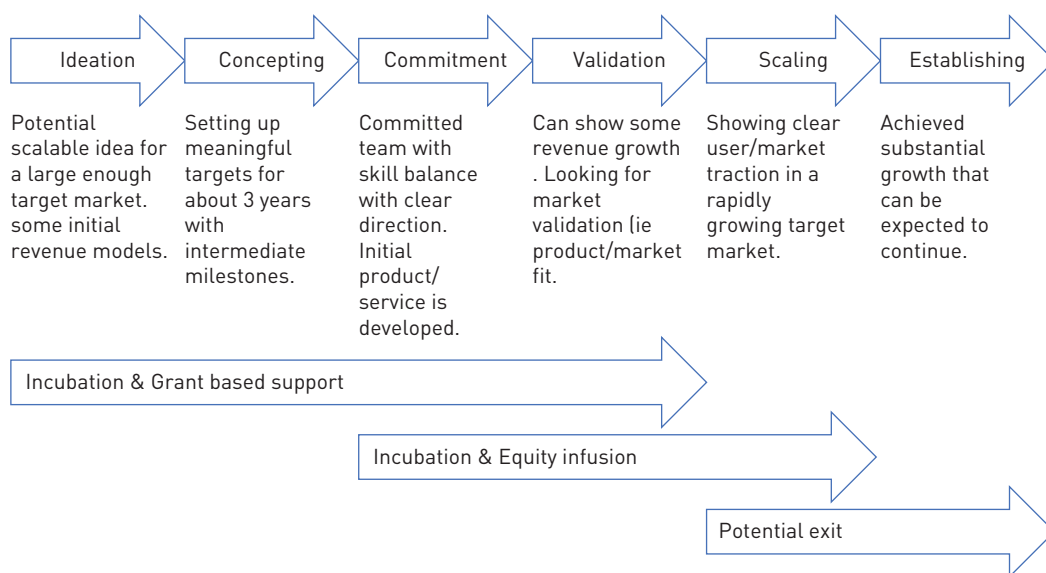
While selecting the companies to support, Villgro uses a mix of generic and specific criteria to evaluate investments. The generic criteria include commitment of the management team, its track record, and technical skills, as well as its business feasibility and scalability. The specific criteria include creating social impact at scale, which means alleviating hardship of the underserved combined with replicability, which often requires an innovative solution.

Over the years, the social enterprise ecosystem has grown and Villgro has contributed by starting platforms that enable networking, discovery, and symbiosis between entrepreneurs, investors, and other stakeholders. These platforms include I PITCH, an annual deal discovery platform; and "unconvention," an annual confluence of stakeholders and collaborators in the field of social entrepreneurship that enables networking and related benefits

### Operations

Villgro supports enterprises in the sectors of education and employability, health-tech, cleantech, and agribusiness. The incubated start-ups are supported in the areas of seed funding, with equity infusion or grants, enabling access to mentors and experts. Villgro

**Chart 6. Schematic Diagram Explaining Villgro's Operations in Dispensing Grants and Equity**



offers additional support through a close network of corporates, investors, and other start-ups for go-to-market support, follow-on fundraising, and collaborations (chart 6).

Villgro can incubate these impacts focused on early-stage start-ups with the support of its strong donors. These donors include international foundations, such as The Lemelson Foundation, The Rockefeller Foundation, and Ford Foundation; entities undertaking corporate social responsibility (CSR), such as Hindustan Unilever Foundation, HDFC Bank, Rabo Foundation, and Mercedes Benz; multilateral agencies, such as Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), United Nations Development Programme, and Department for International Development; and government agencies, such as Biotechnology Industry Research Assistance Council, Technology Development Board, and Startup India.

Villgro avails of CSR grants that are given as a part of being an incubator. Notably, Villgro was the first incubator that is not an educational institution which received permission to accept CSR grants as an incubator.

### *Working with Other Industry Participants*

Villgro works with multiple late-stage investors to discover and fund start-ups from their portfolio. For example, Villgro is working closely with its sister VC fund Menterra Ventures. Often, a grant may be in the initial stages and may receive equity when the product is ready, and it may have been able to contract a few customers. In other instances, a grant may come from Villgro with an equity infusion from late-stage VC funds.

### *Lessons Learned*

During early stages of agriculture projects with a substantial impact component, grants along with technical assistance of donors in the form of mentors, experts, and network support can substantially improve project viability and comfort for mainstream investors, which in turn can mobilise additional private capital.

# 8. Conclusion

Climate change is one of the biggest challenges of our times, and the growth in investments according to environmental, social, and governance issues as well as climate change criteria attests to the growing recognition by investors to the possibility that capital can make a difference. Agriculture, however, is an area that has a significant impact on climate change, and a large gap exists between the intention of investors and the actions that are needed to make a difference. This report and the accompanying case studies are an effort to bridge that gap, raise awareness, and hopefully catalyze private capital to areas where it is most needed.

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