

Sustainable rural agri-food system transitions in Brazil, India, and South Africa

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Cover photo: A farm with a solar water pump in Haryana state, India (IWMI/Flickr).

Executive summary

Achieving the goals of the Paris Agreement and limiting global warming to 1.5° C will require massive societal and economic transitions to greener pathways. As countries move toward the implementation of their climate goals, policymakers, industry leaders, and labor organizations are working to better understand the scope and impacts of transitions and to develop policies that address the social and economic burdens that these transitions could impose. Although the Just Transition dialogue has advanced in many ways, much of the discussion currently focuses on the energy and industrial sectors. Shifting to a greener economy will entail sustainable transitions across multiple sectors.

Currently, agriculture and land use are responsible for one-third of global greenhouse gas (GHG) emissions. The agri-food sector provides the primary source of livelihood for many of the 3.4 billion people around the world who live in rural areas. Many rural areas face deep poverty and inequality, along with climate change impacts that are increasing the vulnerability of agri-food systems. There is an imperative for a just and equitable transition that enhances resilient livelihoods, creates jobs in the rural economy, and encourages sustainable food production. As philanthropy continues to engage with just transition issues, we encourage funders to consider sustainable rural agri-food system transitions as a priority area for moving toward a greener economy.

In this report, we explore what sustainable, inclusive, and equitable transitions in rural communities might look like, highlighting the complex role of agri-food systems in achieving sustainable rural development. Agri-food systems support billions of rural livelihoods, yet they are adversely affected by, contribute to, and offer solutions to climate change.

We examine work on sustainable rural agri-food system transitions in Brazil, India, and South Africa through three case studies of projects led by NGO partners. In Brazil, Instituto Clima e Sociedade is working to support the adoption of subnational, inclusive low-carbon agriculture (LCA) plans across three states in the Amazon basin. A key component of this work is the inclusion of traditional and local farming communities in federal and state-level planning. In India, Village Empowerment and its local partners are working to support and implement integrated regional and district planning efforts that increase access to more sustainable, reliable, and affordable green infrastructure for priority sectors across last-mile communities. In South Africa, the African Climate Foundation is exploring the potential of regenerative agriculture to both rehabilitate depleted mine lands and create new sources of income and employment in mining communities as well as replace unsustainable agricultural practices.

We highlight four key themes for just transitions across these three projects:

1. Building community resiliency and participation in decision-making through engagement with key interested parties
2. Centering in transition strategies those rural community populations facing the greatest climate change risks and transition impacts and having the least capacity to fund transformation
3. Considering how transitions create new jobs or improve livelihoods
4. Considering strategically how governance structures create enabling environments that can enhance accountability, participation, inclusion, and implementation of solutions

The three case studies offer insights into sustainable rural transitions in three regions that are key to global climate change mitigation efforts — similar challenges and opportunities will emerge as all countries work toward low-carbon economies with increased adaptive capacities and resilience to a changing climate.

These insights can be distilled into eight recommended philanthropic interventions:

1. Elevating direct and inclusive engagement with rural communities as partners in developing solutions
2. Enhancing opportunities for and the capacity of rural communities to participate in national and international policy processes
3. Enhancing the technical capacity of government officials, NGOs, civil society organizations, and farmer groups on climate and on sustainable transitions
4. Increasing the financial capacity of NGOs and civil society organizations to focus on implementation
5. Exploring longer-term funding approaches to facilitate deeper engagement with key interested parties
6. Investing in robust livelihoods data to support evidence-based decision-making
7. Supporting localized subnational policy frameworks
8. Amplifying land tenure security for farming communities as a key lever of sustainable agri-food system transition strategies

Introduction

Amid its transition to a low-carbon pathway, the world faces multifaceted sustainability challenges with implications across diverse sectors. As countries move toward implementation of their climate goals, policymakers, industry leaders, and labor organizations are working to better understand the scope and impacts of transitions and to develop policies that address the social and economic burdens that these transitions could impose. These groups must focus on deep structural transformations that could create new social dynamics and new ways of organizing production and consumption systems and that move us toward more sustainable and inclusive forms of development across all regions, sectors, and communities.

The concept of a just transition has its roots in U.S. labor union movements in the 1980s and 1990s that sought to protect workers affected by new environmental protection policies. The International Labor Organization (ILO) defines *just transition* as “greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.” At the heart of a just transition is the creation of opportunities for socioeconomic growth through green jobs, better natural resource management, and avenues to address social inequalities. The concept recognizes that the costs and benefits of shifting to green economies must be equitably distributed across all parties.

Much discussion about a just transition has focused on the energy and industrial sectors, but shifting to a green economy will entail sustainable transformations of many other sectors.

Sustainable rural agri-food system transitions

Agri-food systems¹ account for more than one-third of global GHG emissions. In the long run, the agriculture, forestry, and other land use sector offers significant carbon sink potential. Currently, however, the sector is a net source of GHG emissions, as a result of deforestation and agricultural activities spanning from land use change and agricultural production to packaging and waste management.

Challenges lie ahead because the sector is particularly vulnerable to climate change impacts. According to the Intergovernmental Panel on Climate Change (IPCC), climate-related extremes have affected the productivity of all agricultural and fishery sectors, with negative consequences for food security and livelihoods. Climate-related hazards have become more common, with droughts, floods, and wildfires disrupting food supply. The Food and Agriculture Organization (FAO) estimates that, worldwide, between 702 million and 828 million people were affected by hunger in 2021. If recent trends continue, the number of people affected by hunger will surpass 840 million by 2030. The IPCC notes that women, the elderly, and children in low-income households, Indigenous peoples, minority groups, small-scale producers, and fishing communities are disproportionately affected by malnutrition, livelihood loss, and rising food costs due to climate change. Additionally, small-scale food producers in sub-Saharan Africa, Asia, small island states, and Central and South America are particularly vulnerable to the impacts of climate change. In a world already impacted by climate change, agri-food system transitions are critical to ensure access to healthy, nutritious food for a growing global population as well as to protect vital natural systems.

¹ The term “agri-food systems” encompasses the entire range of actors, and their interlinked value-adding activities, engaged in the primary production of food and non-food agricultural products, as well as in storage, aggregation, post-harvest handling, transportation, processing, distribution, marketing, disposal and consumption of all food products including those of non-agricultural origin (FAO 2022).

Agri-food systems can play an important role in addressing rural poverty and meeting climate and environment goals for sustainable development. Some 3.4 billion people — or 45% of the global population — currently live in rural areas where agri-food systems provide the primary source of livelihoods. Many rural areas face deep poverty and inequality, which makes rural development a key priority for many countries. Agri-food system transitions have significant potential to create decent green jobs, improve livelihoods, contribute to economic growth, and revive rural communities — all while contributing to urgently needed emissions reductions. To be just, these transitions must meaningfully engage food producers and rural communities, placing justice, equity, and rural livelihoods at the center of their efforts.

To advance such efforts and build on the just transition framework, sustainable rural agri-food system transitions must consider

- **Economies** — What are the costs and benefits of a shift to a green economy?
- **Livelihoods** — What are the opportunities for decent green jobs and livelihood improvements?
- **Inclusivity** — Which groups need to be involved to ensure that the outcomes of transitions are equitable and to build community resiliency in addition to meeting mitigation goals? What do truly inclusive and collaborative decision-making processes look like?

In this report

This report is the result of consultations over two years with three ClimateWorks Foundation partner NGOs: Instituto Clima e Sociedade (iCS), Village Empowerment (VE), and the African Climate Foundation (ACF). These three organizations led the projects that serve as case studies on sustainable agri-food system transitions in Brazil, India, and South Africa, respectively — and provided written inputs and participated in interviews, which helped lay the foundation for this report. The three case studies offer insights into the practicalities of realizing sustainable rural transitions in three regions that are key to global climate change mitigation efforts. They highlight how cross-cutting challenges and opportunities will arise as most countries work toward low-carbon economies while increasing adaptive capacities and resilience to a changing climate.

In Brazil, iCS is working to support the adoption of subnational, inclusive low-carbon agriculture (LCA) plans across three states in the Amazon basin. A key component of this work is the inclusion of traditional and local farming communities in federal and state-level planning. In India, VE and its local partners are working to support and implement integrated regional and district planning efforts that increase access to more sustainable, reliable, and affordable green infrastructure for priority sectors across last-mile communities. In South Africa, ACF is exploring the potential of regenerative agriculture to rehabilitate depleted mine lands, create new sources of income and employment in mining communities, and replace current unsustainable agricultural practices.

These three projects are being developed and implemented within very different regional contexts, but they all suggest four themes for sustainable rural agri-food system transition strategies:

1. Building community resiliency and participation in decision-making through engagement with key interested parties
2. Centering in transition strategies those rural community populations facing the greatest climate change risks and transition impacts and having the least capacity to fund transformation
3. Considering how transitions create new jobs or improve livelihoods
4. Considering strategically how governance structures create enabling environments that can enhance accountability, participation, inclusion, and implementation of solutions

The following case studies explore how each project incorporated these considerations within their unique regional contexts and scopes of work. The studies offer insights not only into sustainable rural transitions in three regions that are key to global climate mitigation efforts but also into challenges and opportunities that will emerge as all countries work toward low-carbon economies with increased adaptive capacities and resilience to a changing climate.

These insights can be distilled into eight recommended philanthropic interventions:

1. Elevating direct and inclusive engagement with rural communities as partners in developing solutions
2. Enhancing opportunities for and the capacity of rural communities to participate in national and international policy processes
3. Enhancing the technical capacity of government officials, NGOs, civil society organizations, and farmer groups on climate and on sustainable transitions
4. Increasing the financial capacity of NGOs and civil society organizations to focus on implementation
5. Exploring longer-term funding approaches to facilitate deeper engagement with key interested parties
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8. Amplifying land tenure security for farming communities as a key lever of sustainable agri-food system transition strategies

Mainstreaming low-carbon agriculture in Brazil: Building a resilient agenda for a just rural transition through expansion of subnational initiatives

Instituto Clima e Sociedade (iCS) aims to support development of robust state-level LCA plans in three states of the Legal Amazon. These plans will include concrete solutions for LCA adoption and clear targets for engaging traditional and local rural communities in LCA practices. iCS and its partners have pursued a three-part strategy: (1) improve the federal regulatory framework for implementation of LCA plans at the state level and increase the participation of small-scale farmers, (2) support the design and implementation of state-level LCA plans, and (3) build and share knowledge across partner countries and Amazon states to assess the replicability of LCA plans and to develop general guidelines for their implementation.



Agriculture in Brazil

Brazil has the largest economy in Latin America and is the fourth largest agricultural-producing country in the world. Brazil is the world's largest producer of coffee, sugarcane, citrus, and soybean and the second largest producer of cattle and poultry after the United States. Additionally, Brazil is the world's fourth largest GHG emitter, with deforestation and agriculture contributing the largest share of total emissions.

Although the agricultural sector accounts for only 5% of Brazil's GDP, it is an important sector for income generation, employment, and foreign exchange. In 2021, Brazil's agriculture sector employed approximately 19 million people, including people working in rural areas and businesses connected to the agribusiness chain.

Smallholder farmers (also referred to as family farmers) are defined by the FAO as “small-scale farmers, pastoralists, forest keepers, fishers who manage areas varying from less than one hectare to 10 hectares mainly using family labor for production and using part of the produce for family consumption.” Smallholder farmers are a critical part of Brazil's agricultural economy and are responsible for 85% of the 5 million agricultural production units across the country. Smallholder farms produce 70% of food consumed domestically and employ 74% of the rural workforce. Smallholder farms — which in Brazil include family farmers, Indigenous and Quilombola² communities, and traditional groups — are predominantly Black- and brown-owned (71.5%), while larger agricultural establishments are predominantly white-owned (72.2%), according to census data from the National Institute of Statistics (IBGE).

Climate change is a major threat to Brazilian agriculture. Prolonged droughts and advancing desertification — along with frequent extreme precipitation and flooding — present major risks to the agricultural sector in the coming decades. Smallholder farmers are particularly vulnerable to these environmental shocks and have access to relatively few resources to adapt to climate change and variability.

Over the years, Brazil's Ministry of Agriculture and Livestock (MAPA) has remained committed to advancing sustainability in Brazilian agriculture, passing positive legislative and financial initiatives both to support sustainable agriculture uptake and provide support for smallholder farmers and tackle rural poverty. Crop production has also made dramatic gains in recent decades, with farmers increasingly utilizing “no-till” agriculture and other climate-smart practices for sustainable output.³ Today, more than 50% of farmers use this technique in addition to resource-saving methods like integrated crop-livestock systems.

² Residents of Quilombos—Afro-Brazilian communities first established by escaped black slaves in colonial Brazil

³ No-till agriculture is a technique where crops or pastures are grown without tilling the soil.

Nonetheless, in order to meet national development, food security, climate adaptation and mitigation, and trade goals over the next several decades, Brazil will need to significantly scale adoption of sustainable approaches to increase the productivity of food and pasture systems while simultaneously reducing deforestation, rehabilitating degraded land, and adapting to climate change. There is a particular need for focused efforts in the Amazon, where unsustainable agricultural practices are among the factors driving massive amounts of deforestation. Furthermore, supporting changes in farming practices by smallholder farmers could contribute to both reductions in deforestation rates and increased incomes by enhancing productivity in the region.

Agriculture challenges in the Amazon

Amazônia Legal, also known as Brazil's Legal Amazon (BLA), is the largest socio-geographic division in Brazil (about 61% of Brazilian territory), and it contains nine federal states: Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima, and Tocantins. The Amazon Basin is home to some 38 million people and represents 9% of the country's GDP. Although economic activities in the Amazonian states are diverse, the main activities are concentrated in the agricultural industry; 12% of the Brazilian Amazon is used for agriculture — primarily cattle ranching and soybean production. The region is also a major energy producer — hydroelectricity, in particular — and was responsible for 21% of the country's electricity generation in 2021.

The Amazon Basin represents about 60% of the planet's remaining rainforests. Deforestation and land use change in the Amazon is a major issue — both as the largest source of GHG emissions in Brazil and as a major threat to biodiversity. Beef production is the largest driver of deforestation in the Amazon, followed by soybean production. Cattle now populate 70% of deforested Amazon areas. In the past 30 years, millions of acres of forest and grasslands have been cleared to grow soybeans. In addition to increased consumption of soy as a vegetable protein and vegetable oil, increased global demand for meat production has also led to increased demand for soy as animal feed for hogs and chickens.

Tackling the issue of forest conversion in the Amazon will require focusing on both small-scale agriculture that has significant cumulative impacts on Amazonian ecosystems and large-scale agro-industrial sectors that have been rapidly expanding operations. However, developing and implementing interventions to support changes in small-scale agriculture requires a deeper understanding of the needs and challenges of smallholder farmers in the Amazon.

Small-scale farming in the Amazon

Smallholder farmers make up 22% of agricultural establishments in the Amazon. These farmers are responsible for a growing share of deforestation, and many say they clear land to grow the food they need to survive. For smallholder farmers who lack technical assistance and income alternatives, converting forests into pastures is the easiest, most affordable, and quickest way to claim land ownership where most land is classified as public. Cattle ranching has low profit margins and requires large amounts of grazing land, driving Amazonian farmers to clear forests to expand pastureland.

Land tenure insecurity has been a long-lasting issue in the Amazon, with some 50% of deforestation in the region occurring on public lands. Despite a national framework regulating land ownership in the country, state agencies have struggled to enforce land rights due to a number of issues, including slow validation processes, lack of integrated databases and systems, and gaps in regulation. Illegal land grabs pose a particular risk to Indigenous lands and Quilombola territories, much of which remains untitled. The absence of secure land tenure has induced conflicts among smallholder farmers, local communities, Indigenous people groups, and large agricultural producers, and that absence is at the root of the difficulties in adopting sustainable land use practices.

Over the years, progressive left-wing governments have implemented policies and programs with targeted support for smallholder farmers and have invested increasing amounts of public funds into family farming support. However, these policies and programs have had their own problems, including lack of credit line and market access, technical capacity, and land regularization. Smallholder farmers were also historically excluded from agricultural modernization processes

under Brazil's "Green Revolution," a state-led process launched in the 1970s to make the country food self-sufficient by boosting agricultural productivity. Although the Green Revolution was largely successful in turning Brazil into an agricultural region and major global exporter, it is criticized for the inequalities it created. By encouraging the uptake of high-yield crops, the Green Revolution shifted Brazilian agriculture from subsistence production to a sector focused on markets, sales, and profits, with growth driven by big multinationals. Access to productive resources, especially land and farm implements, was exceptionally unequal.

Climate change impacts will only make agricultural production more challenging in the Amazon, and smallholder farmers will need more adaptive capacity and support to build resilience to survive. The adoption of low-carbon agriculture by smallholder farmers could lead to productivity gains and more efficient use of agricultural inputs (e.g., seeds, fertilizers, manures, agro-chemicals), resulting in better management of natural resources.

Low-carbon agriculture adoption

Low-carbon agriculture refers to sustainable farming practices characterized by low consumption of energy and resources and limited use of harmful chemicals. LCA methods seek to build soil health and rehabilitate degraded pasturelands. They include practices that reduce or remove the use of synthetic fertilizers, agroforestry, and no-till farming. For LCA in the Brazilian Amazon to scale up, it must address several needs. These include improving smallholder farmers' productivity, encouraging regenerative agriculture to make degraded land productive again and to restore soil, and farming practices that better integrate forest and farming — for example, increasing production of traditional tree crops such as acai and Amazonian walnut.

iCS aims to support development of robust state-level LCA plans in three states of the Legal Amazon: Mato Grosso, Pará and Tocantins. These plans will include concrete solutions for LCA adoption and clear targets for engaging traditional and local rural communities in those solutions. iCS and its partners have (1) participated in the revision process of the federal LCA plan to improve the federal regulatory framework for the implementation of LCA plans at the state level and to increase participation of small-scale farmers, (2) supported the design and implementation of state-level LCA plans, and (3) helped build and share knowledge across partner countries and Amazon states to assess the replicability of LCA plans and to develop general guidelines for their implementation.

BRAZIL – ENABLERS FOR LOW-CARBON AGRICULTURE ADOPTION



- Developing contextual state-level LCA plans with concrete solutions for LCA adoption and clearer targets for engaging traditional and local rural communities in those practices
- Enhancing technical support for smallholder farmers to develop proposals to access credit, apply for funds, and build knowledge of LCA techniques
- Engaging more closely with smallholder farmer groups to better understand their experiences with credit and needs for technical assistance
- Deploying state government and local human resources and building technical capacity to support the development of LCA plans, promote integrated discussions among government departments, and allocate funds toward implementing plans
- Building data and evidence on how LCA adoption can increase smallholder farmers' economic security and food production, including organic production

Engagement with key interested parties

Key components of developing and advancing this project included partnerships with government at the federal and state levels as well as engagement with civil society groups representing the interests of agricultural workers and farmers.

At the federal level, iCS and its partners worked closely with MAPA and the Brazilian Agricultural Research Corporation (Embrapa)⁴ on revision of the LCA plan. In 2021, MAPA launched a public consultation for the second federal LCA plan, welcoming suggestions from civil society, including rural smallholder farmers. MAPA received contributions from 49 interested parties. iCS partner Agroicone was deeply engaged in this process and played a pivotal role in collecting suggestions directed at the public consultation committee, including supporting different organizations such as Embrapa, the Brazilian Rural Society, the National Confederation of Agriculture and Livestock, and the Brazilian Association of Agribusiness in the preparation of text suggestions.

State-level officers from agricultural secretariats were primary targets in the second phase of the project. Working with on-the-ground partners, iCS has been engaged with the governments of Maranhão, Mato Grosso, Pará, and Tocantins. iCS noted that the states of Pará and Mato Grosso were particularly receptive to developing LCA plans and were actively integrating climate change issues into productivity discussions.

The inclusion of smallholder farmers (including family farmers, Indigenous groups, Quilombolas, and other traditional communities) into policy design is at the heart of this project. iCS and partners engaged with large civil society networks, including the National Confederation of Agricultural Workers, the Confederation of Rural Black Communities, the Green Finance Task Force of the Climate, Forest, and Agriculture Coalition, the Smallholder Movement, and the Without Land Movement. There has been wide-ranging support for these groups, and efforts have included encouraging leaders to incorporate climate change into their agendas, supporting the development of local centers for capacity training, supporting locally driven research, and providing technical and financial support for the development of agri-forests. However, lack of technical understanding of LCA opportunities at the local level have made it difficult to generate local support and organize inclusive dialogue. As a starting point, iCS's partners carried out engagement sessions with local civil society actors on the opportunities for smallholder farming in the federal LCA plan.

Governance context

Policy progress and challenges for smallholder farmers and low-carbon agriculture

Brazil has several major public policies dedicated to supporting smallholder farmers. The largest is the National Program to Strengthen Family Farming (PRONAF), passed in 1995, which aims to support family farming through subsidized financing for agricultural and non-agricultural services. Brazil's Plano Safra, or Harvest plan, was established to provide subsidized credit to national agribusinesses. In addition to these, other policies include the National Policy for Technical Assistance and Rural Extension, which aims to develop and provide educational processes and skills training, and public procurement policies (the Food Acquisition Programme and the National School Feeding Programme) that require a certain proportion of food procured by states to come from smallholder farmers.

While these new policies, programs, and credit lines have increased opportunities for family farmers, unique challenges remain. These include highly administrative application processes that are difficult for many smallholder farmers to navigate, a lack of technical assistance to equip farmers with the knowledge to effectively utilize credit lines, and support for commodity production such as cattle and soy at the expense of other food production. The technical assistance federal policy also lacks budgetary allocations and adequate human resources for technicians who can be deployed at the state level. Lastly, public procurement policies require farmers to meet certain criteria to be eligible providers, and most smallholder farmers do not meet the laid-out requirements. For example, farmers must have a land title, sanitary specifications, and a guarantee to supply a specific amount of food.

⁴ The Brazilian Agricultural Research Corporation (Embrapa), established by the federal government in 1973, develops technologies, knowledge and technical information for Brazilian agriculture. Embrapa is tasked with technical oversight, including the development of tools to monitor the implementation for the federal LCA plan.

Although many of these policies were scaled back in recent years, the current federal government has introduced revamped policies to address some of these challenges. Most recently, Brazilian President Luiz Inácio Lula da Silva announced the largest commitment of funding in the history of Brazilian agricultural policy to the Plano Safra 2023-24, and its family farming branch, the Plano Safra da Agricultura Familiar. The R\$364.22 billion announced is a 36% increase from the previous year's plan. The Plan establishes mechanisms to promote sustainable agriculture uptake, with lower interest rates for more environmentally-minded large and medium-sized agribusiness companies. In addition to the increase in funding to PRONAF, the commitment also supports a number of efforts such as public purchases, technical assistance, and rural extension services.

In addition to providing more general support for smallholder farmers, the federal government is attempting to incorporate LCA in agricultural policies. In 2010, MAPA created the national Plan for Adaptation and Low Carbon Emission in Agriculture (ABC Plan). Covering a period of 10 years, the plan focuses on government-backed loans for producers to mitigate GHG emissions. In April 2021, MAPA announced the Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture Seeking Sustainable Development 2020–2030 (ABC+ Plan). The Inovagro program, another credit line of the Safra Plan designated for innovative technologies in rural properties, supports the installation of solar photovoltaic panels for use in irrigation systems, meat and milk cooling, telecommunication systems, and lighting, among other technologies.

Despite these positive initiatives to support smallholder farmers and encourage LCA adoption, LCA implementation is low at the state level due to the lack of state-level plans. The current LCA plan is designed at the federal level, contributing to decontextualized policies that inadequately integrate regional and cultural aspects.

Enabling environment

Political goodwill has also played a central role in state-level LCA plans — both in their development and uptake — in efforts to strengthen climate change agendas, and in the expansion of other public policies.

Initially, state governments had minimal interest in LCA plans, and only a few executed them. However, political interest increased, particularly in the Legal Amazon and Northeast Brazilian states with large smallholder farming units. This interest was due to strengthening of the climate change agenda, pressure from civil society, and a better understanding of what state-level actors could gain from implementing LCA plans. Mato Grosso successfully launched its state plan; Pará and Tocantins have draft plans yet to be launched due to leadership changes.

The replication of LCA plans across states requires governments to effectively define governance structures, evaluate the need for further research, and advance implementation. Legal capacity was a challenge in the first cycle of the federal LCA plan. Still, the revised LCA plan has a good legal framework and relies on other interconnected policies for effective implementation. Its financial capacity is improving, despite multiple programs' competition for the same resources.

Some state-level challenges that can be addressed to support state LCA plans include managing negative political influence on the LCA agenda, appointing staff dedicated to developing the plans, promoting discussions among government departments, and designating budgetary allocation for implementation of the plans.

Field building challenges and needs

Currently, smallholder farmers depend on agricultural production as their main source of livelihood. A post-pandemic national survey on hunger found that hunger affected 21.8% of family farmers and rural producers — food insecurity is particularly acute in the North and Northeast regions, where 54.6% and 43.6% of households, respectively, live with moderate or severe food insecurity. LCA adoption could lead to increases in economic security for smallholder farmers as well as food production, including organic production. However, data on such increases are lacking. Data on small-scale farming more generally are also lacking. Smallholder producers are not homogenous, and family farming systems differ greatly from region to region. There continue to be challenges in developing appropriate approaches that both allow for the scalability of base frameworks and address the unique needs and situations of different groups of producers.

These challenges point to the need for socio-economic research into educational levels, access to basic technology, and use of agricultural machinery as well as examination of public policies targeting smallholder farmers that can be integrated into LCA plans. iCS is looking into further research to support data-driven decision-making regarding LCA practices across the Amazon states.

The major challenge in replicating and implementing LCA plans is supporting technical capacity building at the state government and local levels. The federal LCA plan considers technical assistance, supported by training, to be a key instrument. The plan envisions farm monitoring by trained professionals to enable adoption of recommended systems and measurement of results.

On a positive note, as iCS and partners develop a framework for the effective development and implementation of LCA plans at the state level, there are opportunities for peer learning among agricultural secretariats, and there have been successes at the state level with the organization of working groups.

Smallholder farmers need technical support to develop proposals to access credit lines and to apply for funds as well as to learn about LCA techniques. To effectively participate in policy-making discussions and access LCA mechanisms, smallholder farmers also need to know about other public policies, such as the National Technical Assistance Policy, the Forest Code, and the Land Regularization Policy. A communication plan that synthesizes technical information in an easily understandable and useable way would be helpful for farmers.

Project outcomes and next steps

Low-carbon agriculture could help smallholder farmers increase productivity, adapt to climate change, and enhance sustainable practices that meet forest conservation goals and food production needs. However, successful implementation at the state level requires localized LCA plans, greater coordination among government departments, technical support for smallholder farmers, and additional technical staff dedicated to LCA at the federal and state level.

At the federal level, iCS and partners have successfully supported recent policy wins, including the creation of new types of credit lines for family farmers and for LCA practices.

At the state level, Mato Grosso has successfully launched its LCA plan; Pará and Tocantins have draft LCA plans that have yet to be launched due to administration changes. The next step for iCS is to support the three states in implementing these plans. iCS continues to engage with key interested parties, including the technical staff at the Ministry of Agriculture, with whom they have discussed interventions to support implementation of LCA practices in the Amazon. These interventions include increasing resources for the Safra Plan through annual increments. Additionally, iCS continues to support and facilitate discussions about the need to coordinate state-level LCA plans and the federal LCA Plan and to include smallholder farmers' access to credit in the federal LCA Plan. Lastly, iCS intends to engage more closely with smallholder farmer groups to better understand their experiences with access to credit for LCA and the practicalities of integrating technical assistance with credit access.

District-level planning and clean energy for sustainable agriculture in India

Village Empowerment (VE) and its partners aim to support local governance systems to integrate green and climate-resilient solutions in development activities across multiple sectors through an integrated regional planning approach. This case study focuses on VE's activities in agriculture.



Agriculture in India

Agriculture is central to India's socioeconomic well-being and development. India is primarily an agrarian economy, with more than 54% of the country's land classified as arable. India is the world's largest producer of milk, pulses, and jute and the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit, and cotton. The agricultural sector provides employment to approximately 50% of the population, and accounts for 20% of the country's GDP.

Seventy percent of rural households depend on agriculture, 82% of which are classified as small and marginal farmers.⁵ During the Covid-19 pandemic, the Indian government announced multiple stimulus measures to bolster the agricultural economy and provide support to socio-economically vulnerable populations, including migrants and farmers and micro, small, and medium enterprises (MSMEs).

The agriculture sector is highly vulnerable to the impacts of climate change. Increasing incidences of droughts and floods have negatively impacted groundwater recharge and soil moisture. A warmer climate is likely to negatively affect India's rainfall cycle. In addition to building adaptation measures, India is committed to advancing a clean energy economy that is sustainable, just, and equitable. The agriculture, forestry, and other land use sector accounts for approximately 23% of total national GHG emissions and will be vital to India's pathways to achieving a net-zero economy by 2070. Enteric fermentation (54.6%), fertilizers (19%), rice paddies (17.5%), manure management, food waste, and crop residue burning constitute the bulk of these emissions. In addition to providing benefits for the climate, decarbonizing this sector can unlock affordable and sustainable solutions for agrarian communities as demonstrated by schemes like Kusum (solar-powered irrigation initiative, ensuring energy security for farmers) and Saubhagya (a universal electrification initiative in which the federal government and state governments collaborate).

Sustainable rural transitions in East, Northeast, and South India

The states of Karnataka in South India, Odisha in the east, and Meghalaya, Manipur, and Assam in the northeast rely on farming as the primary source of livelihood (followed by crafts and small-scale manufacturing). Smallholder farmers, who rely on traditional labor-intensive methods of farming, make up a large proportion of the agricultural community. Rugged terrains in these regions hamper access to built infrastructure and market opportunities and compound the agricultural economy's vulnerability to climate change risks and disasters.

In the districts of East Garo Hills in Meghalaya, Sambalpur in Odisha, and Raichur in Karnataka, paddy rice crop production is dominant, among other agriculture and allied activities like fruit and spice production and animal husbandry. These districts have dispersed, low-density populations spread across varied, challenging topographies. East Garo Hills has hilly terrains, which make land vulnerable to soil loss. Sambalpur experiences extreme climates with hot and dry summers followed by humid monsoons and severely cold winters. Farmers here face crop failure and lower yields due to drought

⁵ Marginal farmer is a farmer who cultivates up to 1.00 hectare of agricultural land. Small farmers are farmers who cultivate between 1.00-2.00 hectares of agricultural land.

and a lack of local processing facilities that impact the market value of harvested produce. In Raichur, farmers face power shortages during harvest season, high expenditures for backup power, water availability issues, and a lack of storage and processing facilities. The absence of cooperatives affects dairy and poultry farmers and compels them to sell milk to private dairies or retail customers at relatively low prices. Climate change also impacts livestock health and fodder availability, increasing veterinary costs and livestock feed costs.

Farmers in these districts rely on unsustainable practices, which further impact the natural resources of the region. In East Garo Hills, the traditional methods of jhum cultivation⁶ adversely impact the soil and climate of the region through deforestation. In Raichur, excessive use of chemical fertilizers and pesticides has degraded the soil and led to groundwater depletion. Across the paddy value chain in East Garo Hills and Raichur, most farmers use diesel-operated rice mills, which are costly to run and contribute to GHG emissions and noise pollution.

Integrated planning and clean energy for a sustainable transition

Integrated regional and district planning has the potential to enable access to more sustainable, reliable, and affordable local infrastructure to improve the income and productivity of smallholder farmers. Development planning budgets and expenditures must consider how climate-related challenges contribute to smallholder farmers' lack of adaptive capacity. This understanding can help address immediate climate responses such as floods and slow-onset activities like degraded soil. Breaking district management silos can bring about greater synergies, enable multi-pronged approaches, and maximize resources for sustainable development.

Integrating climate-smart and sustainable energy-driven solutions in pre-farm, on-farm, and post-harvest management can contribute to productivity gains. Technologies like solar water pumps, drip irrigation systems, cold storage, and drying solutions can reduce labor-intensive practices while encouraging the adoption of green solutions across the agricultural value chain.

VE's work is wide-ranging across several key sectors, but this case study focuses on its activities in agriculture, which focus on development — including improvement of livelihoods, healthcare services, climate resilience, and poverty alleviation — through equipment powered by sustainable energy sources. VE supports local governance systems to co-develop plans that integrate sustainable energy and infrastructure at the district-level and to develop frameworks and approaches to enable energy integration into district planning. Solutions for green rural infrastructure in Meghalaya, Odisha, and Karnataka will address key socio-economic priorities in agriculture, healthcare, and education while enhancing local value chains. These outcomes can also contribute to national-level integrated approaches to planning frameworks and guidelines for states.

VE and its partners selected five districts — East Garo Hills, Sambalpur, Raichur, Ukhul, and Dharwad — with potential for sustainable and green infrastructure planning. In-depth research was conducted to assess the districts' climate risk profiles, key livelihood activities, existing development programs/schemes, and relevant interest groups. Collaborative planning exercises were then conducted to produce a longlist and shortlist of green, sustainable, energy-driven, and decentralized technologies for integration into local livelihoods and health systems — and a plan for developing and implementing these recommendations via appropriate program designs in selected districts. This case study focuses on three districts: East Garo Hills, Sambalpur, and Raichur.

⁶ A traditional agricultural process that involves clearing the land of trees and other vegetation, burning it, and the cultivating it for a set period of time. These activities, if conducted in limited conditions, can keep the natural health of forests alive and be climate positive in nature. However, if uncontrolled, can have disastrous consequences instead.



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- Incorporating climate-related challenges and their impact on smallholder farmers' adaptive capacity into development planning budgets and expenditures
- Facilitating greater ecosystem development activities and multi-layered partnerships across district government departments and other relevant parties to converge available resources, and bridge challenges related to intergovernmental transfers of officials
- Introducing green technologies to reduce production costs and increase the value generated from activities across different types of farming, leading to livelihood improvements
- Decentralizing value chains, aided by introducing distributed renewable energy sources, efficient technologies, and a green built environment empowering small and marginal farmers and lower-income groups
- Ascertaining the productive value of clean energy-powered technologies by building data through deep-dive business modelling exercises, particularly for on-farm livelihood activities

Engagement with key interested parties

VE and its partners identified and partnered with “champion” district-level administrators and legislators to advance the goals of its project. These champions helped liaise with relevant parties across the district ecosystems and helped develop district profiles through data and supplementary information. VE and its partners also worked with state-level champions who helped replicate programs across districts. Additional ecosystem development activities and multi-layered partnerships with district government departments could identify other relevant parties and could address the challenge of intergovernmental transfers of officials.

VE and its partners also worked directly with farmers across the select districts, consulting them during needs assessments and when assessing the outcomes of productive uses of technologies. Accurate data regarding the financial health of farming activities was challenging to collect because farmers could not ascertain their total costs for all their farming activities.

Improving livelihoods through agricultural practices

The heart of this project is the advancement of livelihoods through the productive use of equipment powered by sustainable energy sources. The introduction of green technologies can reduce production costs and increase the value generated from activities across different types of farming, leading to livelihood improvements.

In East Garo Hills, new on-farm innovations like sprayers, solar water pumps, and crop-specific innovations like rice hullers, pre-cleaners, and bubble driers can significantly improve the efficiency and productivity of farmers. Livestock is an essential component of the mixed farming system of this region, but local production is currently unable to meet local demands. Innovation and technologies to modernize livestock practices — such as solar water pumps and pressure pumps and value chain-specific innovations like brooders and egg incubators — can improve animal husbandry practices.

In Sambalpur, across the paddy value chain, most farming activities like plowing, transplanting, and field watering are done through diesel-powered tractors and water pumps. During power shortages, diesel-powered generators operate

tube wells. Because climate-induced crop failure is a significant threat to farmers in the district, the construction of farm ponds, sustainable dug wells, bore wells, and drip technology can support water conservation. Cold storage and access to facilities like pulverizers and milling units can also support the farmers in value addition, improving their income.

In Raichur, across the agriculture value chain, heavy dependence on electricity for irrigation increases costs and contributes significantly to pollution and GHG emissions. Technologies like sprinklers and drips are contextually suitable to a dryland ecosystem and can support farms' water management. Similarly, soil testing kits can help farmers determine the soil's nutrient level and pH content, allowing them to understand the type and quantity of fertilizer needed to improve the farm's soil. 80% of farmers in the district sell milk direct to retail customers due to a lack of processing facilities. Solar-powered innovations like milking machines, milk chillers, vaccine carriers, hydroponics units, and egg incubators can allow farmers to add value to their milk production.

Decentralized value chains — aided by distributed renewable energy sources, efficient technologies, and a green built environment — can enable small and marginal farmers and lower-income groups to gain a larger share of the agriculture and food economy. Additionally, these value chains can significantly impact the macroeconomy's ownership patterns and power structures. For example, millet crops have high nutritional value and are suitable for many climates. However, millet is processed in central locations outside many districts where it is grown. Millet significantly increases in value after processing and cannot be consumed locally until processed. Smaller, local millet processing centers powered by solar can add value to and build local supply chains (as well as generate co-benefits such as reduced transportation-related emissions), with macro-level implications for the political and cultural environment.

In economic terms, it is difficult to ascertain the productive value of clean-energy-powered technologies, especially when free family labor is involved. Collecting more accurate quantitative data to build a body of evidence involves initiating deep-dive business modeling exercises, particularly for on-farm livelihood activities. Further analysis must be conducted to select value chains with the highest scaling potential for integrating green infrastructure and clean energy. Criteria could include scale of production; prioritization within district, state, and national plans; potential for climate adaptation and mitigation; and involvement of small and marginal farmers.

District-level governance

This project mainly focuses on the role of district-level governance structures in innovating and scaling sustainable energy solutions. It recognizes a strong need for district authorities — particularly those involved in livelihood development — to integrate their programs with sustainable energy sources and technologies. District authorities are a significant enabler of implementing plans, given their capability to generate public grants and hold financial linkages via public banks. Political goodwill from district-level champions proved essential to effectively collaborating with government departments on planning efforts. The involvement of Panchayat Raj Institutions (PRIs) — a bottom-up system of rural local self-government — varies greatly depending on the institutions' existing capacity and maturity.

Integrated governance approaches are also critical to this project, which looks to access entry points within existing schemes. Leveraging current investments and converging resources by bringing together various programs (which government departments were willing to explore) allows for more efficient use of those resources. However, collaboration across departments varies — and converging resources for technology or energy access deployment lacks precedence. A district-level overview is critical to understand the possibilities for converging funds and programs.

Finally, ownership of plans is critical to ensure implementation. Possible options for ownership include district collectors,⁷ local NGOs with strong champions, and line department agencies as well as national initiatives and flagship programs such as the Rural Livelihood Missions and National Rural Employment Guarantee Scheme, which generally channel budgets through line departments and have district support units for implementation. Additional areas of consideration, which vary by district, include field presence, organizational capacity and expertise, longer-term presence, and permanence.

⁷ District collectors are chief officers of the revenue administration responsible for the collection of land revenue. They are a point of convergence of all activities at the district level and are extremely important and catalytic when planning for SDG7 application or just rural transition programs. A district collector once convinced regarding the effectiveness of a program or approach can open many doors and make available finance resources from many sources to aid program deployment.

Field-building challenges and needs

Capacity-building programs within government departments and agencies can enable a large network of government officers to help increase awareness of and scale up programs. However, these programs must include technical capacity-building support. There is also a need to build knowledge about entrepreneurial business models so that applications of sustainable energy-driven technologies scale up small businesses and financial allocations speed the businesses' growth. And there is a need to support local civil society organizations through appropriate capacity-building efforts.

Project outcomes and next steps

With its partners, VE successfully created district-level plans for integrating climate resilience and sustainable energy in livelihoods and healthcare in its selected districts. It supported implementing selected programs in three of five districts. VE's work showcases the importance of holistic planning. With evidence from this work, it has demonstrated the possibility for scaling of its program in similar districts in the state.

Ultimately, VE and its partners aim to accelerate the large-scale adoption of sustainable solutions for livelihoods. Regional livelihood planning approaches have proven to be unique to local contexts. However, district profiling, decentralized renewable energy access and livelihood development, and holistic and integrated planning approaches can be applied at the national level. In contrast, district planning efforts aimed at greening public healthcare systems (another key focus area of VE's project) can, to a large extent, be standardized across districts and states and can lead to a replicable and scalable framework at the pan-India level. This framework could work in countries such as Sierra Leone, Ethiopia, Somalia, and Burkina Faso.

The potential of regenerative agriculture to support a just rural transition in Mpumalanga, South Africa

The African Climate Foundation (ACF) is exploring the potential of regenerative agriculture to rehabilitate depleted mine lands and create new sources of income and employment in mining-dependent communities in the Mpumalanga region. This study seeks to build a body of evidence to demonstrate the social, economic, and environmental potential of regenerative agriculture as an alternative pathway for the development of the region as it shifts away from a coal-mining economy. Building on previous work in the Gauteng region, the study tests the applicability of the model developed in there and in the Mpumalanga regions, with a longer-term view of demonstrating scalability across the country and eventually in other parts of the continent.



Transition challenges in South Africa

South Africa (population 60 million) is the most industrialized country on the African continent and is considered an upper-middle-income economy. South Africa is the largest GHG emitter in Africa and one of the 20 largest emitters in the world.

The country's reliance on coal energy is the primary source of its high emissions. South Africa's economy and energy supply are highly dependent on the mining of domestic coal. Coal provides some 70% of the country's primary energy needs and is also a major foreign export. The coal industry employed more than 90,000 people nationwide in 2022. While the South African government has committed to reducing its reliance on coal for electricity, the decommissioning of coal-fired plants across the country is likely to be difficult. In addition to ongoing issues with power supply and an already-high national unemployment rate of 32.9%, transitions that entail any potential job losses are politically sensitive.

Agriculture is another key economic sector for South Africa. Agriculture contributes about 6% of the country's total GHG emissions. The agri-food industry contributes an estimated 5% to the national GDP and 14% of all exports of goods. Large-scale farms employ about 51.4% of the agricultural workforce and generate 67% of farm income. Smallholder farms employ 37% of the agricultural workforce and generate 23% of farm income.

Like many countries, South Africa is experiencing severe climate change impacts from increasingly unpredictable rainfall, drought, and flooding. By mid-century, the increases in daily maximum temperatures in the western regions of the country are projected to surpass the world average, and droughts, wildfires, and flooding will occur more frequently and with greater severity. The country has embraced some climate-smart agricultural practices to address climate change impacts, including integrated land-use planning, minimal soil disturbance, rotational grazing, rainwater harvesting, multi-cropping, water conservation, and natural resource-based farming.

However, South African agriculture relies heavily on rainfall, making the sector highly vulnerable to hydrological changes. Smallholder farmers are particularly vulnerable to the impacts of climate change and need legislative, financial, and technological solutions to effectively build their climate-adaptive capacities. Additional challenges in this sector include the use of pesticides, herbicides, chemical fertilizers, seed hybrids, and monoculture, which have been linked to pollution and severe biodiversity loss, including the loss of microorganisms that support soil health. These factors have contributed to declining soil health and nutrient loss, which have increased food production costs.

Transition challenges in Mpumalanga

Mpumalanga is South Africa's coal heartland and a focal point of a just transition as the country seeks to reduce its reliance on coal as its primary energy source. The province is in the country's northeastern region and has a population of just over 4 million. Mpumalanga produces an estimated 80% of South Africa's coal, and is deeply dependent on its coal sectors for jobs, local municipal services, social spending, industrial fuel, provision of household cooking fuel, and mixed infrastructure.

With an unemployment rate of just over 38% for the region, coal plant closures in Mpumalanga put many jobs at risk and could contribute to widespread economic and political distress. National and provincial governments have consistently prioritized coal mining and power generation at the expense of alternative economic development models. The closure of mines in South Africa has historically overlooked social and environmental outcomes for mining communities during and after mine closures. Mining-dependent communities have not been adequately consulted during and after these closures. Community involvement in just transition discussions and processes is uncoordinated, government initiatives lack synergy, and most engagement with key interested parties is by nongovernmental organizations. Meaningful community participation is limited by language constraints, a lack of community participation tools, and the adoption of a tokenistic approach by key interested parties such as government and private companies. Under-resourced NGOs and advocacy groups cannot keep up with all the demands for interventions.

Abandoned coal mines have also been a major issue for the province. The 2002 Mineral and Petroleum Resources Development Act (MPRDA) requires mining companies to rehabilitate the environment affected by mining and to set aside financial provisions adequate to cover costs of rehabilitation; however, government enforcement of these requirements has been poor. As a result, communities are unable to access many lands with closed mines. Simultaneously, unrehabilitated coal mines and degrading coal infrastructure pose serious risks for nearby residents.

Agriculture as an alternative pathway

Identifying viable and sustainable livelihood alternatives to coal mining is crucial to addressing transition challenges faced by mining-dependent communities in Mpumalanga. Enter agricultural production. In addition to coal production, Mpumalanga is also an important agricultural region for the country. Half of the 3% of South Africa's soil considered to be of high agricultural potential is in Mpumalanga. Mpumalanga's climate favors a range of agricultural commodities such as citrus, bananas, macadamia nuts, and potatoes. About 14% of the province's land area is natural grazing land used in the production of beef, mutton, poultry, dairy and wool. In arid regions, cattle and sheep farming is predominant, while intensive crop and mixed farming is predominant in the high rainfall areas.

Several economic, environmental, and regulatory factors impact the agricultural sector's productivity and growth. Land ownership issues and climate change significantly impact agricultural productivity and present a complex backdrop. Land ownership is a critical enabler for implementation of soil health practices. Farmers who operate on insecure, short-term lease agreements are unlikely to invest in measures to improve soil health that don't quickly increase production. Given the long-term benefits, farmers who own the land are much more likely to support soil restoration practices. In South Africa, land ownership is highly racialized, rooted in the apartheid-era colonial land laws. The country's history of racial and spatial discrimination under apartheid legitimized land injustices, which resulted in a highly centralized agricultural sector primarily dominated by white farmers, with emerging black farmers facing many obstacles to entry. Even now, white farmers operate 72% of the country's arable land but account for just 10% of its population. While land reform is a

If agriculture is to be a viable alternative in a just transition, the sector needs to be transformed through more sustainable land management practices and new ownership models.

government priority, the progress of redistribution, restitution, and land tenure reform has been slow despite legislative procedures and frameworks such as the Reconstruction and Development Programme. Less than 7% of the land has been redistributed since 1994, under a “willing buyer, willing seller” model. A just transition cannot be predicated on the current ownership model of South African agriculture, which has seen the Black rural class relegated to on-farm labor, rather than owning land. Approaches that use regenerative agriculture as an enabler for a just and sustainable transition in South Africa must account for historical injustices.

Climate change is a major threat to the agricultural sector. Mpumalanga and the rest of South Africa will experience more severe climate change impacts in the coming years. Average annual temperatures and rainfall will likely increase, resulting in prolonged periods of drought, followed by excessive quantities of rain, rendering large parts of the province unsuitable for agricultural production.

The African Climate Foundation (ACF) is exploring the potential of regenerative agriculture to rehabilitate depleted mine lands and create new sources of income and employment in mining-dependent communities. As part of the project, ACF undertook extensive biophysical analyses to put forward a risk profile for agriculture in Mpumalanga. The overarching conclusions of this analysis are that agriculture is under moderate to severe risk in Mpumalanga, that current production processes exacerbate this risk, and that regenerative agriculture poses a sound basis for addressing it.

Given the importance of the agricultural sector to Mpumalanga, the need to safeguard against climate change impacts is urgent. Although agriculture is often positioned as a sector with a significant opportunity for growth, that opportunity is predicated on industrial farming techniques that replicate existing ownership models that have depleted the land and exacerbated patterns of inequality, poverty, and unemployment. If agriculture is to be a viable alternative in a just transition, the sector needs to be transformed through more sustainable land management practices and new ownership models.

Regenerative agriculture

Regenerative agriculture describes farming and grazing practices that rebuild soil organic matter and restore degraded soil biodiversity, resulting in both carbon drawdown and improving the water cycle. Traditional agriculture requires a large amount of labor to produce goods and services. Regenerative agriculture requires even more labor, hence its potential for significant job creation. It also has the potential to rehabilitate landscapes degraded by mining by restoring soil health while increasing the quantity and variety of production per hectare of land. Regenerative agriculture has the potential to support a just transition by unlocking climate-resilient revenue sources, value chains, and sustainable economic opportunities in vulnerable communities.

To assess whether regenerative agriculture can support a just transition in South Africa, ACF uses a framework developed by Mohammed and Montmasson-Clair (2021), which suggests that policies and programs must have (1) meaningful engagement platforms that facilitate the inclusion of vulnerable communities in decision-making, (2) scaling capacity to deliver new income streams and livelihood opportunities, and (3) ownership models that dismantle the consolidation of power in a handful of (mostly white) producers.

Engagement with key interested parties

Three parties guided the design and evaluated the outcome of ACF’s project to rehabilitate depleted mine lands and create new sources of income and employment with regenerative agriculture. These parties were government, researchers focused on smallholder farmer issues, and leading farmers in regenerative agriculture. Initially, ACF intended to prioritize direct engagement with mining-dependent communities. However, cross-border and inter-provincial traveling restrictions during the Covid-19 pandemic and the lack of viable digital options prevented such engagement.

Government policies and buy-in are critical for the large-scale adoption of regenerative agriculture. Thus, the government is a primary target for the project’s recommendations. In particular, the LandCare Programme under the Department of Agriculture, Land Reform, and Rural Development was a key interested party for this project. Established under

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- Supporting land ownership reform, which in turn supports the implementation of soil health practices and also improves the quality and quantity of farm labor
- Investing in the technical capacity of the province and its associated municipalities, enhancing their ability to implement policy measures on mine closures, agrarian and land reforms, and develop investment opportunities to catalyze a just transition
- Deploying adequate financial and human resources and inclusion of sub-national actors in policy development to contribute to policy implementation
- Supporting new and existing institutions provide extension services and provide grants to reform current agricultural practices that incorporate elements of a just transition
- Building more quantitative and qualitative data on regenerative agriculture employment in South Africa to understand better its potential to support a just transition

the Conservation of Agricultural Resource Act (CARA), the LandCare Programme promotes sustainable land use and drives employment around the country. It is South Africa's only government program that could support the rollout of regenerative agriculture at scale. The LandCare Programme grant was set up to promote sustainable land use and management of natural resources through community-based activities. Its goal is to optimize the productivity and sustainability of natural resources to increase food security and create jobs. Initially, engagement revealed that mitigating emissions from the agriculture and land use sector as well as climate change impacts on food production were top concerns of the LandCare Programme. A keenness to create value chains outside of primary agriculture and to explore prioritization of a just transition emerged with continued engagement.

ACF seeks to use the insights and recommendations of its regenerative agriculture project to support South Africa's Presidential Climate Commission, by starting to build out more evidence on how agriculture might provide an alternative economic pathway as the country transitions away from coal..

There is a significant lack of quantitative and qualitative data on regenerative agriculture employment in South Africa. To begin to fill this evidence gap, ACF consulted five regenerative farmers with small and mid-sized operations in the region to learn more about farm operations and to collect specific insights about labor intensity on their farms, skills development approaches for workers, remuneration, and employment security. One farmer grows wheat and maize using inter-cropping, no-till practices, and zero inputs and pursues cover-cropping during off-seasons. Two farmers engage in intensive chicken and pig rotational grazing, which has eliminated inputs and reduced feed needs by 100% for one farmer and 70% for the other. Another farmer engages in mixed farming during the peak season; during the off-peak season, he allows neighboring farmers to graze cattle on his land. The last farmer farms fruit to produce wine while using chickens to eliminate beetles and invasive plants.

ACF also engaged with university researchers, who, together with government partners, co-developed the conceptual framework and research questions with ACF and provided input on the project's analysis. Whereas government partners were primarily concerned with economic implications and food production, farmer partners were concerned with the challenges that climate change poses to their livelihoods. Academic partners added a more theoretical perspective, suggesting the application of a justice framework to the project. Thus, the ACF project's theory of change is rooted in three justice principles: procedural justice to ensure that decision-making processes are inclusive and co-created and that they build broad-based ownership and trust; distributive justice to mitigate the negative impacts of transition and to

unlock new economic opportunities; and restorative justice to leverage transition plans to address long-term historical dynamics (in this case, challenging the domination of South Africa’s production markets by a white minority).

ACF held joint monthly online progress meetings with partners to encourage engagement during the development of the study. One of the challenges of engaging with diverse partners was building consensus on critical issues. For example, the government, researchers, and farmers had varied understandings of the meaning of regenerative agriculture and the principles of a just transition. Those more acquainted with the climate sector understood those principles well; those focusing on agriculture had limited knowledge of them because agriculture has been sidelined in justice conversations. To address this challenge, ACF facilitated brief learning sessions as a part of and in addition to the monthly engagements to share knowledge, offer clarity, and expand ideas on sustainable rural transitions.

Labor potential and livelihood improvements

Livelihood considerations were a critical theme. ACF’s project assesses, on the one hand, whether regenerative agriculture is an economically viable option as the region transitions away from the coal sector — and on the other, whether regenerative agriculture creates better livelihood opportunities than current agricultural employment.

The uptake of regenerative agriculture cannot necessarily be tied to higher income potential. However, ACF found that regenerative agriculture practices could improve skill development and seasonality of employment. Integrating livestock and intensifying production per hectare means labor adapts to perform new functions, such as herding, building infrastructure, and producing new farm products. In contrast to industrial farm workers, regenerative farm workers are employed permanently instead of on short-term contracts — a rarity in the agricultural sector. This is because the rotation of crops and the integration of livestock require year-round management. Increasing the variety of activities performed on regenerative farms also creates opportunities to improve workers’ skill diversity.

In the near term, a shift from mining to regenerative agriculture would have some negative socioeconomic impacts. They include many short-term job losses in the mining and power generation sectors and cascading effects from those losses on families and communities dependent on sectors associated with but not directly linked to mining. Additionally, in South Africa, coal mining tends to provide better wages and union support than agriculture, given the country’s strong coal legacy. Therefore, in the near term, it is doubtful that regenerative agriculture would effectively compensate for the loss of jobs from the closure of coal infrastructure.

However, a comparison between industrial and regenerative agriculture reveals that if Mpumalanga were to transition from primarily coal production to agricultural production, regenerative agriculture would provide a better economic development pathway given its labor intensity requirements and potential to upskill workers. Nonetheless, policy interventions are needed to address key structural issues.

Governance structures to support development and implementation

Mpumalanga’s provincial government needs a more robust enabling environment to implement the policy measures in place, including those on mine closures and agrarian and land reform. While the provincial government’s mandate includes land use planning, implementing the district development model, and providing finance for various public initiatives, its technical capacity is currently limited to engagement and communication activities on just transition issues. The [Mpumalanga Green Cluster Agency](#) was set up to support the government and businesses in unlocking economic opportunities in the green economy in Mpumalanga. It can help address the technical capacity limitations of the provincial government.

Significant investment in the technical capacity of the province and its associated municipalities is needed. Additionally, local actors in South Africa should not be overlooked in implementing interventions; their knowledge of how to operate on the ground is valuable. Therefore, all relevant key interested parties, including the provincial government, the private sector, communities, and NGOs, should collaborate to develop a pipeline of investment opportunities to catalyze a just transition in Mpumalanga.

A lack of adequate finance and human resources and the exclusion of subnational actors in policy development significantly contribute to the lack of policy implementation in South Africa. ACF's project examined more than 36 policy interventions that could encourage the uptake of regenerative agriculture. Of these interventions, only three had associated implementation mechanisms and supported the principles of a just transition. These are the mass rollout of land reform for mining-dependent communities, the provision of extension services (informal training for farmers) to provide advisory support to farmers on regenerative agriculture, and the provision of grants under the South Africa LandCare Programme to farmers practicing conservation agriculture. The remaining interventions lacked implementation mechanisms and depended on various government agencies integrating ideas into their development plans.

Field-building challenges and needs

ACF's study finds that regenerative agriculture can improve the quality and quantity of farm jobs across several indicators. However, providing a just transition away from both coal-reliant regional development as well as the current unsustainable agricultural model requires implementing certain policy interventions to unlock the restorative and redistributive potential of regenerative agriculture — namely, land reform, provision of extension services, and provision of grants.

Several factors make the 2019 mandate of the Presidential Advisory Panel on Land Reform difficult. They include complex and occasionally costly registration of land tenure, under-resourcing of land reform, weak coordination among government departments, and changing policy agendas.

The provision of extension services is concentrated in the private sector, making them difficult for farmers to access due to high costs, cumbersome bureaucratic requirements, or both. Supporting existing and new institutions to provide extension services offers opportunities to reform current agricultural practices, incorporating elements of a just transition.

The provision of grants is fundamental to enabling the uptake of regenerative agriculture. Transitioning and emerging farmers have a range of upfront costs before their overall expenditures decrease. In the long term, farmers can offset costs by buying fewer inputs, including feedstuffs, fertilizers, and plant protection products. However, initial seed funding is required until the farm becomes profitable. Loans, by contrast, have locked many farmers, especially emerging farmers, into unsustainable debt compounded by the effects of poor harvests from unforeseen weather patterns.

Another challenge revealed by the ACF project was the consensus of all interested parties on agriculture-related climate change impacts, regenerative agriculture, mine closures, and just transition principles. This challenge requires technical support for engagement with different groups. ACF conducted learning sessions as part of or in addition to monthly engagement sessions.

Project outcomes and next steps

Regenerative agriculture can build adaptive capacity to transitions – both in terms of shifts away from fossil fuels and the transformations necessary to withstand harsh climate change impacts at the farm level. However, the quality and quantity of farm labor and the quality of land ownership models must be considered to ensure just outcomes. These reforms will require a robust enabling environment.

ACF regards its stakeholder engagement process as a particularly successful outcome of its project. Key interested parties expressed enthusiasm for using the research and better understood their roles in supporting sustainable and just transitions. ACF continues to engage with the Presidential Climate Commission and seeks to work with the Department of Agriculture. It also is engaging with Sibanye Stillwater, a private South African mining company that will co-finance a pilot project focused on ways to rehabilitate mining land through regenerative farming in Marikana town.

Cross-regional insights and learnings

Although the scopes of work and regional contexts for each of this report's three case studies differ substantially, four themes emerge (1) building community resiliency and participation in decision-making through engagement with key interested parties, (2) centering in transition strategies those rural community populations facing the greatest climate change risks and transition impacts and having the least capacity to fund transformation, (3) considering how transitions create new jobs or improve livelihoods, and (4) considering strategically how governance structures create enabling environments that can enhance accountability, participation, inclusion, and implementation of solutions.

Engagement with key interested parties

A key consideration of all three projects was identifying and consulting with key interested parties as equal partners. All three projects incorporated the input of these parties in project plans and interventions and in outcome evaluations.

Across the projects, we find that engagement with government actors is an important component in building governance structures and capacity to develop and implement policies (discussed in more detail below). Nongovernmental organizations and civil society organizations are also central to enabling catalytic partnerships among different actors to support sustainable rural agri-food transitions.

Centering rural communities in transition strategies

All three cases centered rural communities — both as beneficiaries and as drivers of interventions — in transition strategies. In the Brazil and India case studies, smallholder farmers are among the groups that face the greatest climate change risks and transition impacts. Across these regions, smallholder farmers are often trapped in low-productivity farming practices and have limited access to markets and resources. In South Africa, mining-dependent communities that face the social and environmental impacts of coal plant closures are at the center of the project strategy.

We see that each project considers (1) complex socio-economic and political contexts that have led to the exclusion of some groups in past transitions, (2) existing governance schemes to support these groups, and (3) strategies to address historical social and economic inequalities and vulnerabilities.

The projects reveal the need to

- Improve direct and inclusive engagement with rural communities as partners in developing solutions.
- Support participation of excluded rural communities in national and international policy processes such as the United Nations' Climate Conference of Parties (COP).
- Synthesize technical climate information into knowledge outputs that are accessible and easy to use for farmers and that allow them to effectively participate in dialogues on climate and a just transition and to more strategically engage in the climate space and advocate for their needs.
- Provide resources to NGOs and civil society organizations to undertake and coordinate engagement in implementation-focused activities.
- Create long-term funding that supports long-term relationship building with key interested parties.

Job creation and livelihood improvements

A fundamental consideration for sustainable transitions is how they impact the livelihoods of rural communities. All three projects aspired to ensure that sustainable transitions create new green jobs and that changes in agriculture practices (including increased access to resources, technical support, adoption of technologies) support livelihood improvements. In Brazil, the goal was to support the adoption of LCA practices among Amazon smallholder farmers to both reduce agricultural sector emissions and boost productivity and the capacity to adapt to climate change impacts, contributing to livelihood improvements. In India, the objective was to uplift livelihoods through integrated district planning that enables access to clean and affordable energy. In South Africa, the research focused on the potential for economic empowerment through regenerative agriculture in mining communities.

The projects reveal the need to

- Gather the evidence needed to support the uptake of project recommendations and to scale adoption more widely.
- Find and analyze data on livelihood empowerment.
- Collect data to help demonstrate how sustainable transition strategies might link to existing priorities and to promote evidence-based decision-making.

Governance structures

The interaction of policies, programs, institutions, and politics at all levels of government can create governance structures that better enhance accountability, transparency, participation, and inclusion of all interested parties. In all three case studies, we see the importance of working within the frameworks of existing policies and programs — either aligning objectives or addressing needs gaps — and working with governments to design and implement solutions.

The central role of subnational governments in driving forward and implementing sustainable rural transitions is evident in all three projects. For Brazil, state-level leadership is essential in developing and implementing low-carbon agriculture plans to support the adoption of more sustainable agricultural practices in states. In India, regional and district-level governance is critical in developing and implementing integrated district planning. Finally, in South Africa, provincial action on policy measures is needed to support regenerative agriculture.

The projects also highlight the need for contextualized subnational policies to enable sustainable rural transitions. In Brazil, the federal LCA plan does not account for each state's unique realities, hence the need for tailor-made state-level LCA plans. In India, a district-level approach — including district profiling to understand local contexts as a starting point — is critical to successfully implementing integrated development plans that meet the needs of smallholder farmers. In South Africa, supporting a transition from coal to regenerative agriculture requires enabling provincial policies, including agrarian land reform. The case studies also demonstrate the importance of existing policies and dialogues as entry points.

The projects reveal the need to

- Build the technical capacity of government officers at all levels of government to champion and drive implementation of sustainable rural agri-food transitions.
- Prioritize land ownership in sustainable transition programs given that land ownership is a key enabler in the adoption of better agricultural practices.

Conclusion

Deep understanding of local contexts is critical for sustainable rural agri-food transition work. Although smallholder farmers are a key stakeholder group in agri-food system transition work across different regions, the historical causes of their marginalization differ, and interventions must target these causes. Furthermore, to gain political support and legitimacy, rural agri-food system transition work must align with existing political priorities and, where possible, should be integrated into existing governance schemes to be most effective.

Given the importance of regional contexts in developing and particularly in implementing solutions, regional regranteeing organizations can play a critical role in providing insight into regional socio-economic and political contexts and in leading relationships with local organizations and other stakeholder groups.

More generally, we see an imperative for sustainable agri-food system transitions within the context of any, and every, country's efforts to move toward a low-carbon economy. In many cases, the majority of GHG emissions come from rural areas, which also face an urgent need for increased resilience to a changing climate. In all cases, the transitions required for long-term GHG reductions will require systemic transformations that must include, and ultimately benefit, rural communities.

Just, equitable, and lasting transitions must build resiliency and participation in decision-making through engagement with key interested parties and particularly historically excluded communities; show how transitions create new jobs and improve livelihoods; and finally, consider strategically how governance structures can enhance accountability, participation, inclusions, and implementation of solutions.

Delivering healthy nutritional outcomes must be an important component of sustainable rural transitions. While building resilience of food systems and livelihood improvements — including interventions to increase productivity, diversification of crops, and boost in incomes — can increase food security and access, for example, this report does not explicitly explore these interconnected issues in depth. We encourage readers to delve into the work of partners listed below for information on how rural agri-food system transitions can help deliver sustainable and healthy nutritional outcomes.

As governments, civil society, and philanthropy continue to focus on just transition issues intertwined with energy sector transitions, we encourage funders to also consider sustainable rural agri-food system transitions as a priority for moving toward a long-term, sustainable economy. Philanthropy, in particular, can play an important role in supporting work in this space by developing interventions aimed at

- Elevating direct and inclusive engagement with rural communities as partners in developing solutions
- Enhancing opportunities for and the capacity of rural communities to participate in national and international policy processes
- Enhancing the technical capacity of government officials, NGOs, civil society organizations, and farmer groups on climate and on sustainable transitions
- Increasing the financial capacity of NGOs and civil society organizations to focus on implementation
- Exploring longer-term funding approaches to facilitate deeper engagement with key interested parties
- Investing in robust livelihoods data to support evidence-based decision-making
- Supporting localized subnational policy frameworks
- Amplifying land tenure security for farming communities as a key lever of sustainable agri-food system transition strategies

Resources

There is growing interest in just and sustainable rural agri-food system transitions and a variety of organizations that explore this issue. We encourage readers to delve into their work.

The Just Rural Transition Initiative brings together food producers, governments, businesses, investors, civil society, rural and Indigenous peoples to champion equitable solutions to food systems challenges. It fosters a global community of public and private sector stakeholders. Through their own commitments and by creating new partnerships, stakeholders design, implement, and scale integrated and inclusive approaches that contribute to the objectives of the JRT Vision Statement. Learn more about the Just Rural Transition Initiative: <https://justruraltransition.org/>

The Just Transition Initiative is a partnership developed by the Energy Security & Climate Change Program at the Center for Strategic and International Studies (CSIS) and the Climate Investment Funds (CIF) to investigate how to achieve a just transition through the transformational change necessary to address climate change. Learn more about the Just Transition Initiative: <https://justtransitioninitiative.org/about>

The Food and Land Use Coalition is a self-governed community of more than 60 organizations and individuals committed to transforming food and land use for people, nature and climate. The Coalition promotes science-based solutions to unlock collective, ambitious action that will ensure food and land use systems play their part in delivering the Sustainable Development Goals (SDGs) and achieving Paris Agreement targets. Learn more about the Food and Land Use Coalition: <https://www.foodandlandusecoalition.org/>

Reports

Actionaid International. [“Principles for a Just Transition in Agriculture.”](#) 2020

Carbon Brief. [“Climate Justice: The challenge of achieving a “just transition” in agriculture.”](#) 2021.

The FAIRR Initiative. [“Just Transition in Animal Agriculture: Implications, risks and opportunities.”](#) 2022.

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Glossary of Acronyms and Definitions

BLA: Amazônia Legal or Brazil's Legal Amazon

ABC Plan: National Plan for Low Carbon Emission (2010–2020)

ABC+ Plan: Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture Seeking Sustainable Development (2020–2030)

ACF: The African Climate Foundation

Agri-food systems: The term “agri-food systems” encompasses the entire range of actors, and their interlinked value-adding activities, engaged in the primary production of food and non-food agricultural products, as well as in storage, aggregation, post-harvest handling, transportation, processing, distribution, marketing, disposal and consumption of all food products including those of non-agricultural origin (FAO 2022).

CARA: Conservation of Agricultural Resource Act

COP: United Nations' Climate Conference of Parties

District Collectors: District collectors are chief officers of the revenue administration responsible for the collection of land revenue. They are a point of convergence of all activities at the district level and are extremely important and catalytic when planning for SDG7 application or just rural transition programs. A district collector once convinced regarding the effectiveness of a program or approach can open many doors and make available finance resources from many sources to aid program deployment.

Embrapa: Brazilian Agricultural Research Corporation

FAO: Food and Agriculture Organization of the UN

GHG: Greenhouse gas

IBGE: National Institute of Statistics

iCS: Instituto Clima e Sociedade

ILO: International Labor Organization

Inovagro program: A credit line of the Safra Plan designated for innovative technologies in rural properties, supports the installation of solar photovoltaic panels for use in irrigation systems, meat and milk cooling, telecommunication systems, and lighting, among other technologies

IPCC: Intergovernmental Panel on Climate Change

Jhum Cultivation: A traditional agricultural process that involves clearing the land of trees and other vegetation, burning it, and then cultivating it for a set period of time. These activities, if conducted in limited conditions, can keep the natural health of forests alive and be climate positive in nature. However, if uncontrolled, can have disastrous consequences instead.

Just Transition: Greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent working opportunities and leaving no one behind ([ILO](#))

Kusum Scheme: The Kusum Scheme is aimed at ensuring energy security for farmers in India along with honoring India's commitment to increase the share of installed capacity of electric power from non-fossil-fuel sources to 40% by 2030.

Low carbon agriculture (LCA): Low-carbon agriculture refers to sustainable farming practices characterized by low consumption of energy and resources and limited use of harmful chemicals. LCA methods seek to build soil health and rehabilitate degraded pasturelands. They include practices that reduce or remove the use of synthetic fertilizers, agroforestry, and no-till farming.

MAPA: Ministry of Agriculture and Livestock

Marginal farmer: A farmer who cultivates up to 1.00 hectare of agricultural land. Small farmers are farmers who cultivate between 1.00-2.00 hectares of agricultural land.

MPRDA: Mineral and Petroleum Resources Development Act

NGO: Non-governmental organizations

No-till agriculture: A technique where crops and pastures are grown without tilling the soil

Plano Safra: Brazil's Harvest Plan, first established in 2003 to provide subsidized credit to national agribusinesses

PRIs: Panchayat Raj Institutions

PRONAF: National Program to Strengthen Family Farming

Quilombola: Residents of Quilombos—Afro-Brazilian communities first established by escaped black slaves in colonial Brazil

Regenerative agriculture describes farming and grazing practices that rebuild soil organic matter and restore degraded soil biodiversity, resulting in both carbon drawdown and improving the water cycle

Safra Plan or Plano Safra: Annual agricultural and livestock financing plan

Saubhagya Scheme: a universal electrification initiative in which the federal government and state governments collaborate

Smallholder farmers: small-scale farmers, pastoralists, forest keepers, fishers who manage areas varying from less than one hectare to 10 hectares mainly using family labor for production and using part of the produce for family consumption

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