

Soil to Sky

Climate Solutions that Transform

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The Federation of Huni Kui People of the State of Acre (FEPHAC) focuses on better organizing the governance of the Huni Kui people by defending human rights, preserving traditional knowledge of sacred medicines, and bringing communities together. Image courtesy Grassroots International.

Cover images: Clockwise: Top, 1. Asociación Femenina para el Desarrollo de Sacatepéquez (AFEDES) / Women's Association for the Development of Sacatepéquez addresses inequality, economic and food insecurity, chronic malnutrition, and the exclusion of Indigenous women in Guatemala. Image courtesy AFEDES. 2. National Peasant Movement of Papaye Congress (MPNKP), Haiti. Image courtesy CLIMA Fund. 3. Cusco, Peru. Image courtesy CLIMA Fund. 4. Forest Action, Nepal. Image courtesy CLIMA Fund.

About this Report

This report synthesizes evidence of how grassroots movements successfully mitigate climate change, specifically in the food and energy sectors. This report was prepared by CEA Consulting with support from Gopal Dayaneni at the request of the CLIMA Fund, a funder collaborative comprised of four public foundations (Global Greengrants Fund, Grassroots International, Thousand Currents, and the Urgent Action Fund for Women's Human Rights). CLIMA Fund members have given over 20,000 grants to grassroots groups in 168 countries over nearly four decades. The report seeks to spark inspiration and reflection within the climate funding community by 1) lifting up effective grassroots climate solutions shifting food and energy systems and 2) providing recommendations on who, how, and what to fund for durable and transformative change. We hope to strengthen understanding, recognition, and support for grassroots movements and help inspire a significant increase in funding towards innovative solutions borne and led by grassroots leaders.

This report is informed by extensive desk research and conversations with funders and community members during 2022. The authors are solely responsible for the report's content, including any errors. We are grateful to the CLIMA Fund staff and partners for the resources, perspectives, and support they shared with us. We want to specifically thank Mariam Mayet (African Centre for Biodiversity), Kentebe Ebeador (OilWatch Africa), and Shalmali Guttal and Anusha Lall (Focus on the Global South) for serving as advisors during this process.

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Tegallalang Rice Terrace, Indonesia. Image courtesy Paolo Nicoletto, Unsplash.

Executive Summary

***Soil to Sky: Climate Solutions that Transform* presents evidence of how grassroots climate solutions provide innovative and meaningful impact at the global scale.** This report builds on the evidence and strategic recommendations that were published in 2019 in *Soil to Sky: Climate Solutions that Work*. Our aim is to show the centrality of grassroots climate solutions in achieving a more livable and just future, and the importance of funding in accelerating those solutions, especially in light of nations' inability to move quickly enough to avert the worst impacts of a changing climate. This report connects the dots between stories of change and global impact, demonstrating how grassroots climate leadership is already forging a more ecologically and socially just world.

Climate change is one of the most pressing global crises of our time. People worldwide with less access to resources and structural power are facing the harsh consequences of climate change. In the past decade, extreme weather events have displaced an average of 20 million people annually, and displacement is only expected to worsen. For the past few years, the Global North has contributed 92 percent of global emissions, with per capita emissions triple those in the Global South. Furthermore, the wealthiest 1 to 10 percent in each country emit more than the remaining 90 percent of a country's population.

The food and energy sectors are the highest emitters globally. Today's global food system relies on industrialized agriculture, which has been credited with increased yields since the Green Revolution. Yet the same systemic flaws (or flaws by design) of the food system (e.g., proprietary technology, pesticides, and fertilizer use) are driving both hunger and climate change. The industrial food sector, including long-distance global transport, is responsible for 30 to 50 percent of human-produced greenhouse gas (GHG) emissions and reinforces a profoundly inequitable and unsustainable industrial food chain. Global energy demands remain highly dependent on fossil fuels, with the combustion of fossil fuels accounting for up to 75 percent of GHG emissions globally. Although electricity is the primary power source for many, contributing about 25 percent of heat-trapping emissions globally, about 14 percent of the global population lacks access to electricity or a grid. Places highly dependent on foreign and centralized energy or industrial and imported food have been severely impacted by recent events that have exacerbated hunger and driven up energy prices.



Women farmers of Blowatch, South Africa examine grain. The group challenges industrial agriculture and demonstrates agroecology as a means of ensuring biodiversity while attaining food and seed sovereignty and social justice. The peasant-based agriculture that it advances feeds 70% of the world population while using only 30% of agricultural land and water. Image courtesy Vanessa Black.

Many countries are on the verge of losing their food, energy, and political security. This report explores how the climate crisis and global food and energy production have largely been shaped by the forces of extractivism, colonialism, white supremacy, and heteropatriarchy, and how grassroots climate solutions are creating pathways for change.

Grassroots climate justice movements have made powerful strides in advancing food and energy solutions; increased philanthropic investment could be catalytic. Grassroots climate solutions are bottom up and people centered, and they are led by grassroots groups connected and accountable to those most impacted by a problem. Grassroots groups work through movements to advance democratized, dispersed, decentralized, and interconnected solutions. Grassroots groups and movements analyze the root causes of the problem and develop collective visions to address them based on their expertise and lived experiences. This report outlines how grassroots food and energy solutions create resilient communities, generate scaled outcomes, and connect to philanthropic climate objectives.

Sector

Grassroots climate solutions

Food



Grassroots groups advance a powerful alternative to the industrial food system: agroecology. Agroecology is a practice, science, and movement that uses ecological and social concepts and principles in the design and management of sustainable agricultural ecosystems. The report highlights agroecological solutions with demonstrable social and mitigative impact, such as 1) eliminating synthetic fertilizers/pesticides, 2) implementing agroforestry models, and 3) reducing food transportation, storage, and loss.

Energy



Grassroots groups promote two particular solutions as a means to phase out global dependence on fossil fuels and prevent further harm from the climate crisis: 1) community governance of renewable energy (e.g., microgrids) and 2) preventing harm from resource extraction. The science is clear; all fossil fuel extraction must end to ensure a livable planet. Energy systems are becoming less reliable and more expensive.



East Africa. Image courtesy David E. Bonaldo, AdobeStock.

Climate action has typically focused on symptoms (e.g., increasing atmospheric carbon dioxide, rising sea levels, and higher temperatures) rather than root causes. The preferred treatment has been market-based and technological approaches often referred to as false solutions. False solutions are climate strategies that may be premised on addressing climate change but in practice do not meaningfully contribute to long-term emissions reductions, are unsustainable, violate the principles of environmental justice, perpetuate harm to communities or create new harms, and avoid tackling the underlying drivers of the climate crisis. This report explores the connection between grassroots climate solutions and false solutions because the latter often undermine the effective grassroots solutions outlined below. False solutions have garnered skepticism from many scientists, academics, and practitioners given their limited durability and scalability, yet they receive significant philanthropic funding that could be directed elsewhere.

The role of philanthropy in addressing climate change is clear: it must leverage existing and effective grassroots climate solutions. Philanthropy has a strategic opportunity to revise grantmaking portfolios to fundamentally reconsider who, how, and what it funds. Although intersectional and holistic climate approaches—such as the grassroots climate solutions outlined in this report—may not be within the comfort zone of philanthropic funders, they are precisely what is required to address the global climate crisis. This report provides recommendations on how philanthropy can shift its grantmaking to reflect the need and potential of grassroots climate solutions in food and energy systems. Philanthropic funders can use the power they hold to enhance the leadership, creativity, and commitment of grassroots movements to accelerate change toward a more livable collective future.



Thousand Currents staff accompanied partners for an inspiring learning exchange in Nepal. Image courtesy Thousand Currents.

Introduction

In 2019, *Soil to Sky: Climate Solutions That Work* presented a set of grassroots strategies and solutions that, if adequately funded at scale, could significantly mitigate carbon emissions while uplifting equity and justice.¹ Since the report's publication, some philanthropic funders have increased funding for climate action and are working to integrate a justice lens into their portfolios. Yet funders also continue to prioritize top-down, market-based climate strategies that contribute to the root causes of climate change and undermine grassroots movements driving meaningful and transformative change. Funding grassroots movements led by those most impacted by climate change and those engaging in innovative climate efforts is not only just, but also strategic. This report connects the dots between specific stories of change and global impact, demonstrating how grassroots climate leadership is already forging a more ecologically and socially just global future.

Climate change is one of the most significant ecological, political, and humanitarian crises of our time. Extreme levels of surface warming have pushed the planet toward a tipping point, with the current warming trajectory expected to steer the world toward a 2.4°C increase scenario.² Extreme weather events have displaced an average of 20 million people annually since 2008.^{3,4} The number of internally displaced people across six regions due to climate change could reach 216 million by 2050; Africa could see as many as 105 million migrants; East Asia and the Pacific, 49 million; South Asia, 40 million; Latin America, 17 million; and Eastern Europe and Central Asia, 5 million.⁵ Women are disproportionately impacted by climate change because they represent most of the people living in poverty in these regions and depend more on threatened natural resources.⁶ Furthermore, an average decline of 69 percent in species populations within the past decades has forever altered the health of the planet.⁷

Low-income countries and communities face the harshest consequences of climate change, despite their small historical contribution to global emissions. Small island developing states and coastal settlements are disappearing, food production is diminishing, access to clean water is declining, and people are facing severe health complications, including death, from extreme weather events. People whose livelihoods and cultures are closely intertwined and in deep relationship with their immediate environment (e.g., fishers, peasant farmers, Indigenous Peoples) and whose position in society is marginalized (e.g., women, youth, Afro-descendent communities) are greatly impacted by drastic fluctuations in weather systems and global supply chains. Since 2015, the Global North has been responsible for 92 percent of global emissions. Moreover, just 100 companies have been responsible for 71 percent of emissions in the past three decades.^{8,9} Per capita emissions in the Global North were three times higher than in the Global South, at 10.6 tons of CO₂e, during the last 30 years.¹⁰ Within national borders, these divides are similarly stark. In nearly every country, the wealthiest 1 to 10 percent of the population emits far more than the remaining 90 percent.¹¹ The affected communities live with the most risk, face the most violence from the ensuing instability, and have the least power in decision-making.

The root causes of the climate crisis are most prominent in food and energy production—the largest emitting sectors globally. Over time, global food and energy production has largely been shaped by extractivism, colonialism, white supremacy, and heteropatriarchy. These systems, inherently maintained through violence, drive the climate crisis and insulate the least vulnerable from their consumption and production effects. The divide between those most responsible for the climate crisis and individuals most impacted by climate change maps clearly onto economic, racial, and gender divides. For an articulation of how these root causes manifest within the climate crisis, see Table 1.

Table 1. The primary root causes of climate change

Root Cause	Description	Manifestation within the climate crisis
Extractivism 	<p>Extractivism functions through growth and profit at all costs. It involves extraction of labor from people through various forms of exploitation and extraction from the natural world, facilitated by the privatization and commodification of nature.</p>	<p>The global extractive economy created unsustainable production and consumption structures with high costs to global environmental and social systems. The extractive economy pollutes air, water, and land, exploits workers, and emits GHGs directly responsible for a changing climate. Global financial institutions engage in capitalism by incentivizing territorial dispossession and deforestation under the banner of “economic development,” relying upon an enclosure system. International policies, such as free trade laws and investor-state dispute clauses, privilege corporations while undermining social and environmental protections.</p>
Colonialism 	<p>Colonial systems ensure the financial, political, and ecological dominance of high-income nations to the detriment of countries still grappling with the legacies of conquest, genocide, and extraction. Modern-day colonialism heavily relies on extractivism; it remains a prominent and effective tool for colonial powers and multinational corporate actors to obtain resources and labor from the Global South.</p>	<p>Historical impacts of colonialism, including historical emissions from Global North countries, and neocolonial forms of subjugation and control, such as structural adjustment policies and predatory lending, have starved Global South countries of the financial and political infrastructure to respond to the climate crisis adequately. For example, debt stocks have risen substantially due to the COVID-19 pandemic, and African nations put in debt by the Global North have had to continue borrowing heavily to bankroll healthcare, responses to the climate emergency, and social welfare, resulting in crucial government resources being diverted from addressing climate change and natural habitat loss.</p>
White Supremacy 	<p>White supremacy is a structure of power that institutionalizes racial hierarchy and dominance via social, economic, and political systems that collectively reinforce the belief that whiteness is superior and entitled. It is linked to racism, which Ruth Wilson Gilmore defines as “the state-sanctioned or extralegal production and exploitation of group-differentiated vulnerability to premature death, in distinct yet densely interconnected political geographies.” White supremacy is also interlinked with other systems of oppression, including colonization, capitalism, and heteropatriarchy. States with less structural power are subject to resource extraction to finance their debt to high-income, majority-white countries.</p>	<p>Frontline Black, Indigenous, and communities of color are at the greatest risk of forced climate displacement and being relegated to sacrifice zones, resulting in forced loss of land tenure, culture, identity, and security. They are deliberately ignored or purposely exposed to environmental toxins and pollution from industrial outputs, often to protect richer white communities imbued with the access entitlement of white supremacy. In addition to forced displacement because of climate change, these communities are often forcibly displaced by wealthy, large-scale investors—often from the Global North—sometimes under the guise of false solutions, like tree plantations or the REDD+ program. Group-differentiated vulnerability to premature death is painfully evident. Lumumba Stanislaus Diaping, then-Chief Negotiator for the G-77, declared, “We have been asked to sign a suicide pact,” and went on to assert that the amount of money the Global North pledged for support of climate adaptation in the Global South “is not enough to buy us coffins.”¹²</p>
Heteropatriarchy 	<p>Heteropatriarchy organizes around the personal, social, political, and economic domination of women and queer, trans, and gender non-conforming peoples.¹³ Gender and sexuality are interlocking systems that reinforce one another and shape frameworks of labor and access to decision-making. Heteropatriarchy interacts with capitalism to exploit trans and cis women and gender-diverse peoples while privileging the wealth and agency of cis-gendered men.</p>	<p>Heteropatriarchy resorts to violent tactics to target women and queer, trans, and gender non-conforming peoples on the frontlines of climate change. Heteropatriarchy denies these groups sovereignty over land and water, relegates them to colonial gender roles that limit their decision-making, and carries out militant, coordinated efforts to suppress their resistance. Heteropatriarchy conceals and belittles the leadership of cis and trans women, trans men, gender-diverse peoples, and queer communities by dismissing their research, labor, and experiential contributions to climate mitigation.</p>

Grassroots climate solutions are bottom up and people centered, and they are led by grassroots groups connected and accountable to those most impacted by a problem. Grassroots climate solutions in food and energy promote just transitions and the protection of land, water, territory, seeds, agrobiodiversity, and Earth including its peoples. Such solutions view our relationship with the natural world as reciprocal and without separation, which informs a systemic approach to climate mitigation. Perhaps most importantly, many of the solutions mentioned throughout this report build upon practices applied successfully for millennia. These solutions challenge extractivism, which enshrines wealth and power through predatory financing and law, expropriating natural assets, exploiting human labor, and reducing natural resources to monetary items bought and sold.

■ **Food: Long-standing efforts to decentralize and democratize food production through agroecology are advancing a more just and nutritious food system, and can drastically reduce GHG emissions.**

Peasants are the primary food providers to more than 70 percent of the world's population, using less than 25 percent of agricultural resources.¹⁴ By contrast, industrial agriculture consumes more than 75 percent of agricultural resources and only feeds 30 percent of the people (concentrated in high-income countries).^{15,16} Furthermore, studies show that our current industrial food system is responsible for between 30 and 50 percent of global GHG emissions.^{17,18,19} Over-reliance on mass-produced fertilizers, land-intensive and industrialized livestock practices, deforestation, long-distance transport, and meat-heavy diets, among other examples, have produced immense carbon emissions while undermining territory rights, land, and food sovereignty. Capitalist and colonialist legacies have enabled a counterproductive food distribution system that starves communities of culturally appropriate, affordable, and nutritious diets.



- **Energy: Community governance of renewable energy and resistance to extractivism can phase out global dependence on fossil fuels and prevent further harm from the climate crisis.** The science is clear; all fossil fuel extraction must stop to ensure a livable planet for future generations. Fossil fuels have powered economies for the past 150 years and account for 80 percent of the world's energy consumption.²⁰ The combustion of fossil fuels accounts for up to 75 percent of GHG emissions globally, with electricity/heat generation as the largest-emitting sector, followed by transportation and manufacturing.²¹ Although electricity is the primary power source for many, contributing about 25 percent of heat-trapping emissions globally, an estimated 1.1 billion people (one-eighth of the global population) lack access to electricity or a grid.²² The consumption of coal, oil, and natural gas (the three primary fossil fuels used in the global supply of energy) is expected to surpass pre-pandemic levels in the coming years, reinforcing the need for alternative ways to power communities worldwide.^{23,24}



Self-sufficient farming in Morocco. Image courtesy Monticello, Shutterstock.

What are grassroots climate solutions? Grassroots climate solutions are democratized, dispersed, decentralized, and interconnected; result from collective and direct action; create targeted pressure and alternatives; and are born out of their respective communities. People-based solutions are essential to achieving an equitable, cleaner, and cooler world and provide cross-cutting benefits (e.g., racial/social justice, gender equity, public health, and Indigenous sovereignty) that address systemic challenges and improve conditions for all.²⁵

Characteristics of grassroots climate solutions²⁶



Solutions **target the root causes and underlying systemic drivers** of the climate crisis, such as resource extraction, exploitation of land and labor, and land-use change that benefit extractive economies.



Solutions are relevant **to geographies, communities, landscapes, and ecosystems** to maximize effectiveness and local buy-in, while also connecting across geographies to build powerful trans-local strategies and movements.



Solutions are led by impacted **communities who self-determine their leadership and strategies.**



Solutions **enact and prioritize the leadership of frontline Black, Afro-descendent, Indigenous, and other communities** that have experienced systemic oppression, to advance community-level interventions that address the root causes of climate change.



Solutions **enable adaptive capacity and the ability to respond** to changing environmental circumstances through local governance and protection of land, water, territory, seeds, and the Earth.



Solutions **connect work to protect land, water, territory, seeds, and the Earth with human rights.** They strengthen frameworks such as food sovereignty, energy democracy, gender equity, and the right to decent work.

States and corporations typically focus their efforts on addressing climate change symptoms with market-based and technological approaches.^{27,28} Climate investments that target symptoms (e.g., increased atmospheric carbon dioxide, rising sea levels, and hotter temperatures) are limited in their impact because they do not address the underlying drivers and root causes of the climate crisis, and at times even perpetuate them.²⁹ Over the past decade, governments and corporations have promoted carbon pricing systems (e.g., cap and trade, carbon offsets) as the primary strategy for supposedly efficiently addressing the climate crisis.³⁰ These approaches have created systems where polluters can continue emissions as usual by purchasing the entitlement to pollute and ultimately have little impact on reducing emissions. For example, the U.S. tried to push a cap and trade scheme, perceived as one of the biggest opportunities (and failures) in energy policy, which focused on maintaining economic efficiency within the context of the broader energy crisis.³¹ The effort did not include grassroots groups and faced immense opposition from the environmental justice community, given the increased pollution impacts in frontline communities and the ineffectiveness in actually cutting emissions.^{32,33} Technical approaches devoid of systemic analyses and not tied to movement strategies such as efficiency standards do not challenge or question consumption patterns or historical inequities, nor do they address the range of environmental and societal ills of economic activity.

Grassroots climate solutions in the food and energy sectors promote just transitions by uplifting community sovereignty and democratizing the governance of shared resources, such as food, water, land, and energy. Though definitions vary by region, just transitions generally refer to people-centered, systemic approaches that enable a shift away from extractive economies toward more regenerative systems.³⁴ New economies are reimagined as ones centered on sustainability, inclusion, and intersectionality. The term “just transition” is rooted in the U.S. environmental justice and labor movements and asserts that, although transition is inevitable, justice is not.³⁵ A just transition promotes economic justice and guarantees certain social, economic, and environmental safeguards to protect those most impacted by changes such as in food and energy production. The concept has been adopted by some movement groups globally. Whether or not the term is used, the meaning resonates with international social movements’ strategies to stop the extractive economy,

nurture and build regenerative economies that place life at the center, and create policy change that supports these goals.

Grassroots movements are key to achieving durable and sustainable climate action. Most well-known social transformations were not singular efforts catalyzed by individual entities.³⁶ Grassroots social movements have focused on shifting systems and institutions toward justice and equity. They have played pivotal roles in fundamentally transforming society, advancing scientific knowledge, and democratizing political power.³⁷ Many social justice wins (e.g., civil rights and LGBTQ rights) are the product of grassroots movements.³⁸ Yet grassroots movements remain largely undervalued in international development and philanthropic spaces. Grassroots movements are diverse (long-standing and new), are strategic, and use organizing to advance their strategies by:

- Building a base and democratic decision-making structure led by those most impacted by systems of oppression.
- Identifying and targeting the root causes and underlying dynamics responsible for climate change and injustice.
- Developing collective visions for the world they want to see—based on values of care, well-being, and social/ecological justice and developing strategies to implement those visions together.
- Strengthening local resilience through decentralized and collective governance and deep relationship with the land, water, territory, seeds, and Earth.

“Movements vary greatly around the world, as the context and the people determine the structure and strategies within each movement. They are made up of ideas and actions for social transformation that are fluid, responsive, and dynamic.”

— Thousand Currents



The following are several key strategies employed by social movements to influence policy:

- **Inside-outside strategies:** Social movements often work simultaneously within and outside formal governmental and institutional structures (e.g., through creative forms of protest and community organizing).
- **Alliance-building:** Achieving society-wide impact involves building broad alliances among movements and across coalitions, transcending both sector and scale. Expansive movements benefit from harnessing diverse organizations that bring different experiences, knowledge, constituencies, and relationships in service of a shared goal. These alliances bolster their capacity and competence by working alongside various organizations, government actors, academic institutions, and citizen groups.³⁹
- **Human rights framing:** Where existing policies fall short, social movements are creatively tapping into established human rights instruments, as well as creating new ones of their own as springboards for progressive policymaking.⁴⁰
- **Approaching policy as process:** Social movements understand that the passage of a particular law or policy tool does not signify the end of the struggle, but rather the beginning of a new stage of struggle for effective implementation, as well as protection against cooptation and backlash. Lasting success is most likely when the policy is approached as an ongoing process.⁴¹

“If scaling the Big Greens was going to get us there [solving the climate crisis], we would have won already.”

— Ashindi Maxton, Executive Director of Donors of Color Network⁴³

There is immense opportunity for funders to elevate and support the scaling of grassroots climate solutions. Most philanthropic climate change mitigation funding stays in the Global North promoting top-down approaches, with only 3.75 percent of funding going toward justice- and equity-oriented efforts.⁴² Grants to grassroots groups

are often considered risky because they work beyond and outside the narrow success frames of funders, and perceptions of risk are further amplified by race and gender bias. Table 2 lists how grassroots movements deliver across the main dimensions most funders consider: scale, power, timing, and success.

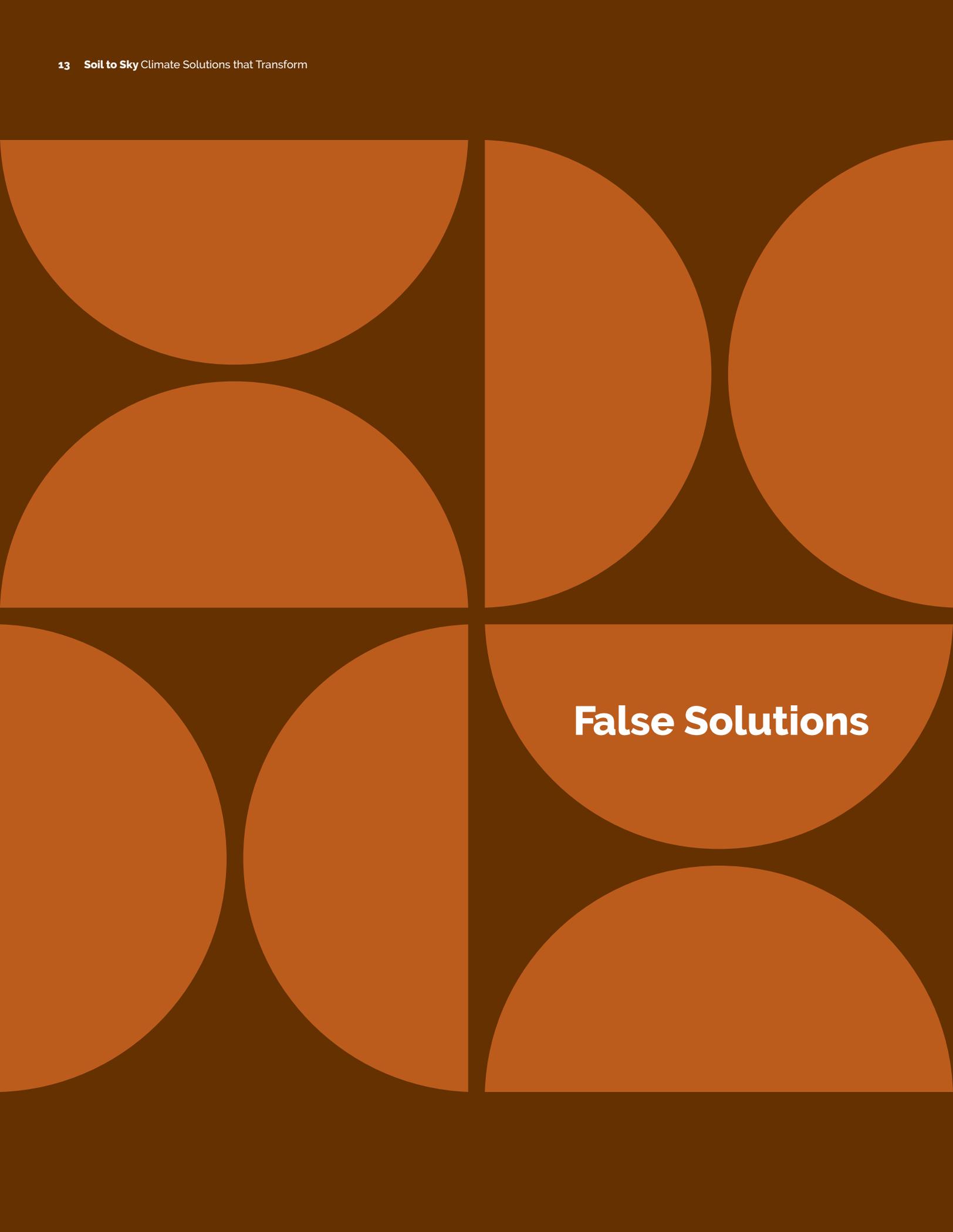
Table 2. Four examples of how grassroots movements enact change

Dimension	Grassroots Approach
<p>Scale</p> 	<p>Grassroots solutions scale in ways often overlooked or not valued by institutional funders and donors because they work beyond notions of scale limited to easily quantifiable siloed metrics. Grassroots groups challenge the funder's framing of scaling up by focusing not only on size and speed but also on influence, depth, and ability to transform structural systems.</p>
<p>Power</p> 	<p>Grassroots formations build power and transform harmful structures by addressing systemic impacts and drivers, rather than focusing on siloed symptoms of climate change. Changing power means shifting the systems and processes that uphold excessive wealth, control over resources, and other structural advantages. Grassroots solutions include leadership development, communication, and resource exchange strategies to build broad political will.</p>
<p>Timing</p> 	<p>Grassroots solutions address broader, systemic drivers that require short-term, mid-term, and long-term strategic planning. Power shifts (e.g., policy, narratives, structures) happen over variable timescales, which do not always align with funders' strategic plans. Although some grassroots action happens quickly, these efforts are not always acknowledged if the outcomes are not the same as those preferred by funders. Deep transformations take time. Quick, siloed fixes via new services or tools do not necessarily signal a change in behaviors and norms, and may even come at the expense of long-term impact.</p>
<p>Success</p> 	<p>Grassroots movements prioritize local and Indigenous knowledge and leadership. They measure success through shifts in values, upholding justice and balanced relationships between people and nature, and overall improvement of livelihoods and well-being, in addition to prioritizing emissions reductions.</p>

Global events continue to demonstrate the need to address climate change holistically within energy and food systems. The world has undergone profound reckoning and loss from the COVID-19 pandemic. The Russia-Ukraine conflict has once again demonstrated the connections between militarism and the extractive economy. It underscores the dire need to address the vulnerability of the global food system and strengthen decentralized, community-controlled, renewable energy and food systems at the same time that we work toward peace and demilitarization.⁴⁴ The vulnerability of the global food system is more apparent than ever as we find ourselves in the third food price crisis in the past 15 years. The rising energy prices alongside supply-chain

implications have significantly affected food prices, fertilizer availability (fossil fuels are a major feedstock), food security, and farmer livelihoods globally.⁴⁵ Global conditions have affirmed the need to approach the climate crisis in a way that addresses structural inequities and promotes people-centered and ecologically minded climate action.

This report demonstrates how grassroots groups are advancing global impact from the local to global levels. It charts how movements are creating systemic, innovative, and effective impacts within the food and energy sectors. To help transition to a more just world with a stable climate, philanthropy must significantly increase global funding and support for grassroots climate solutions.



False Solutions

False Solutions

False solutions are climate strategies that may be premised on addressing climate change but in practice do not meaningfully contribute to long-term emissions reductions, are unsustainable in the long term, violate the principles of environmental justice, perpetuate harm to communities or create new harms, and avoid the underlying drivers of the climate crisis.⁴⁶

– “Hoodwinked in the Hothouse Resist False Solutions to Climate Change,” Third Edition, 2021

The conflict over climate no longer concerns whether the climate crisis is real, but rather how we will respond and who will define the solutions. As the climate crisis has become undeniable, there has been an explosion of proposals that claim to tackle the crisis but in fact harm communities and do not address root causes. These false solutions, as they have come to be defined by climate justice movements, highlight how the interests that spend millions of dollars in denying the existence or seriousness of the climate crisis are also financing and promoting strategies that will preserve existing relationships of corporate power and continue the worst practices of extractivism.^{1,47,48} False solutions claim to mitigate the impacts of climate change but often do not reduce GHG emissions to the degree claimed, and not at the scale and pace required.^{2,49} The emissions reductions claimed by many of these projects and proposals rely on narrowly counting specific carbon emissions using unrealistic metrics (e.g., the failure to meet carbon capture targets).⁵⁰ Furthermore, proponents of these technologies rarely include the embedded energy

and resources required to build these projects (this has long been the case for nuclear power,⁵¹ mega-dams,⁵² and carbon capture⁵³ approaches) or the negative externalities on communities and ecosystems. False solutions, whether in technology or policy, often use the climate crisis as a justification to create new markets and subsidies for the continuation of extractive industries, including fossil fuels and finance capitalism.

False solutions prey on funders' very legitimate anxiety about the urgency of the climate crisis. It is easy to become enamored with proposals that claim to quickly mitigate the crisis to “at least buy us some time” or “avoid the worst impacts.” Many proponents of false solutions admit that these strategies are less desirable than the direct elimination of emissions at the source, but they claim these technologies are more politically realistic.^{54,55} Yet these proposals are often untestable,³ unaffordable,⁵⁶ unpredictable, and undemocratic. False solutions also distract from or undermine the community-led solutions to the climate crisis outlined in this report that deserve widespread adoption. The urgency we feel is real, but we must not allow urgency to enable desperation that bolsters false solutions.

The concerns and impacts of false solutions, as defined by the climate justice movement, are well documented.⁵⁷ False solutions are often grounded in the following underlying assumptions:

- **Carbon fundamentalism:** Climate disruption is limited to atmospheric concentrations of GHGs, and anything that can potentially reduce GHG emissions is good.
- **Social injustice is a separate issue from climate:** Concerns related to environmental justice, gender justice, and economic inequality may be important, but must be separated from the climate crisis.
- **Technology will save us:** The Earth, earth systems, and life itself can be thought of as machines to be hacked, re-designed, or re-engineered.
- **The underlying drivers of the economy are immutable:** The viability of climate solutions is constrained by the extent to which they “fit” into the existing economic and political order. This view would largely preserve the root causes of the climate crisis.

¹ Extractivism” refers to a complex of self-reinforcing practices, mentalities, and power differentials underwriting and rationalizing socio-ecologically destructive modes of organizing life, through subjugation, depletion, and non-reciprocity. Simply put, it is the appropriation and accumulation of the wealth of the living world, removed faster than the capacity of living systems to regenerate.

² A new report by the International Energy Agency estimates that if all existing and proposed CCS facilities in the world worked at their full, proposed capacity, they would store less than 1 percent of just what was added to the atmosphere last year. Carbon capture projects capture .1 percent of global carbon emissions.

³ Technofix solutions, such as ocean iron fertilization, stratospheric aerosol injection, and cloud thinning, all require deployment at such large scales that they cannot be tested sufficiently to account for emergent consequences. Because of the scale and massive complexity of earth systems, the only way to actually test for long-term or emergent consequences is to deploy them. At that point, they cannot be easily undone, if at all.

Diving deeper:

We offer this chart as one way of contrasting the different assumptions and consequences of climate justice and of carbon fundamentalism. We do not consider this an exhaustive list, but rather a useful starting point for considering some of our visible and invisible underlying assumptions.

Climate Justice

TEK-Know (*Traditional Ecological Knowledge*)

Bottom-up, decentralized, place-based

Example: agroecology

Holistic systems approach

Understands Earth and living systems as complex and interconnected

Example: rights of Mother Earth

Socio-ecological adaptive resilience to navigate the transitions for greatest well-being

Example: wetlands restoration

Decentralize and democratize relationships of governance and power

Example: energy democracy; free, prior and, informed consent

Defend and expand bio-cultural diversity

Example: Food sovereignty, rights of Indigenous peoples

Reduce consumption & redistribute equitably

Justice is necessary to address the scale, pace, and implications of the climate crisis, and we must return to balance

Example: campaigns to “keep it in the ground,” just transition

Carbon Fundamentalism

Techno fix(ation)

High-tech, top-down, mega-scale

Example: “climate-smart agriculture” (see below)

Techno fix(ation)

Uses carbon metrics and mechanistic thinking

Example: carbon markets

Industrial adaptation to fortify existing systems against climate impacts

Example: sea walls

Concentrate power in the hands of the few by perpetuating the gross accumulation of wealth from the living world

Example: finance- and resource-intensive corporate technologies (e.g., direct air capture)

Monotonize seed, soil, and story, reducing both biodiversity and cultural and linguistic diversity through globalization, commodification of life, and imposition of development on communities

Example: REDD+ programs, “debt-for-nature swaps”

Endless growth & appropriation

Inequality is unavoidable and corporate globalization is unstoppable

Example: carbon capture and sequestration

For climate justice movements, evaluating the efficacy of climate solutions is based on a number of factors, including whether they perpetuate or create harm, address the root causes of the ecological crisis, are democratically governed, and center those who are most impacted. This includes respect for Indigenous Peoples’ rights to free, prior, and informed consent. There is a vast

array of false solutions being challenged by grassroots-led social movements and frontline communities, and it is outside the scope of this report to list them all. We offer two exemplars in food and energy that have traction in philanthropy, policy, and industry: climate-smart agriculture and carbon capture and sequestration.

Climate-smart agriculture

As noted in this report, an estimated 30 to 50 percent of all GHG emissions come from the industrial food chain. Industrial agricultural production alone, which is better described as *mining for calories*, represents an estimated 26 to 33 percent of global GHG emissions when including land use and deforestation.⁵⁸ Moreover, agribusiness controls 75 percent of the world's agricultural resources, yet feeds less than 30 percent of the world's population.^{59,60} Climate-smart agriculture (CSA) is an agribusiness-led vision of high-tech, high-surveillance, data-driven, "farmerless farming."⁶¹ It includes farmer-led crop selection for varieties more tolerant to climate shocks, but also is used to embrace genetic engineering, corporate ownership of seed,⁶² and monocropping with overuse of fertilizers to maximize yield.^{63,64} The industry also creates carbon credits that can be traded on carbon markets. Carbon markets in agriculture do not work and are particularly problematic due to phenomena including leakage and price volatility, as documented by the National Family Farm Coalition and Institute for Agriculture and Trade Policy.⁶⁵ CSA is primarily a tool for the continued corporate concentration of the food system, and it reduces farmers' ability to manage their food production in a way that responds to their needs and the needs of their communities.

CSA has been widely promoted. Among those claiming CSA's value are the world's largest fertilizer manufacturer (Yara); the world's largest pesticide companies (Syngenta and Bayer); McDonald's; and Walmart.⁶⁶ A new push is coming from Agriculture Innovation Mission 4 Climate (AIM4Climate), which was launched in Glasgow at COP26 in 2021. While promoters of CSA claim they can more "efficiently" deploy industrial fertilizers, pesticides, and herbicides, civil society organizations have long contested these claims.⁶⁷ What is often not included in the dominant narrative of CSA, as promoted by AIM3Climate and other pro-corporate initiatives, is the tremendous energy intensity of these interventions, from data capture to field robotics. Moreover, industrial fertilizers, pesticides, and herbicides are petrochemicals that are destructive to local ecosystems and communities. A 2021 report on AIM4Climate noted that Bayer estimated it has 69 billion data points from its applications, translating to 7 GB of data per acre. This means collecting data from U.S. corn fields alone would use at least 3.3 billion kilowatt hours of energy (3.3 terawatt hours)—approximately the annual electricity consumption of a nation like Senegal.⁶⁸ New on-farm technologies, few of which farmers can control or repair themselves, are also extremely energy intensive.

"Who is financing this scheme?" This line of inquiry taken by social movements to interrogate the relationships of power can reveal underlying motivations. CSA is supported by agribusiness, which is inextricably tied to the fossil fuel and petrochemical industries.⁶⁹ For example, the AIM4Climate Initiative is led by the petrostate United Arab Emirates and is a public-private partnership led by UAE, the U.S. State Department, and agribusiness.

Many of the technologies promised by CSA are unproven and demand more energy and resource inputs than they would be able to recoup in climate benefits. Far more concerning is the forced dependence of small farmers on large corporations, undermining their self-determination and traditions. Not only does CSA cause harm, but it also distracts from investing in real solutions that reduce emissions, restore soil and ecosystem health, and are led by community-rooted farmers and agricultural workers. A recent report quantified low-risk land sector approaches to curb emissions and highlighted that proposals like CSA are not justified, given existing pathways that support Indigenous sovereignty and peasant rights.⁷⁰

Carbon capture and storage

Carbon capture and storage (CCS) and carbon capture, utilization, and storage (CCUS) are touted by many politicians, Silicon Valley, and the fossil fuel industry. Yet these technologies are extremely expensive, lead to continued pollution in low-income communities and communities of color, and are premised on the perpetuation of a fossil fuel economy. Ultimately, they create greater financial and climate risks now and in the future.⁷¹

CCS/CCUS are technologies to capture carbon from powerplant smokestacks, refineries, and other polluting industries. The carbon is then either pumped into geologic formations for storage purposes or, more commonly, used for enhanced oil recovery (EOR). EOR uses CO₂ to access fossil fuel deposits that are otherwise inaccessible or less accessible. Another related technology, direct air capture (DAC), proposes to directly remove carbon from the atmosphere through chemical or mechanical means and utilize the captured carbon for industrial purposes (e.g., EOR, cement production, and production of fuels). While CCS has been used for some time for EOR, it has not been scaled, with over 90 percent of existing projects underperforming or outright failing in the power sector.^{72,73} For example, in October 2022, NRG Inc. sold its share of the PetraNova Power Plant in Texas for pennies on the dollar because

the plant failed to effectively capture emissions.⁷⁴ In fact, after more than 50 years of research and development, and billions in investment, CCS/CCUS projects are more likely to fail than to succeed. Most recently, 10 of the 13 most promoted projects failed, according to the Institute for Energy Economics and Financial Analysis.⁷⁵ The only financially successful projects are the ones that help access more fossil fuels.

Similar to CSA, the primary promoters and financiers of CCS/CCUS and DAC are the fossil fuels industry, which stands to benefit from their development and use. Both CCS/CCUS and DAC are only viable with massive subsidies and/or by creating more liquid fossil fuels, according to a 2019 analysis by the Center for International Environmental Law.⁷⁶ In fact, it has been widely reported that the fossil fuels industry is receiving billions in windfall subsidies from the U.S. federal government (and governments around the world) for CCS/CCUS and DAC, and further billions from the tech industry, despite their proven inefficacy.⁷⁷ Because direct subsidies, tax breaks, bail-outs, and low-cost financing for these technologies are coming from a diversity of actors, it can be hard to quantify the total amount. A survey of subsidies by Food and Water Watch in August 2022 puts the figure at well over \$10 billion per year.⁷⁸ Grassroots organizing to protect lifeways and keep fossil fuels in the ground have done far more with far less to address the climate crisis.

From the perspective of grassroots-led climate justice movements, these costly, unproven, and ineffective strategies are allowing continued pollution, while distracting funders from supporting proven solutions.

While social movements are calling for a clean energy transition to energy democracy, the fossil fuel industry is angling to extend the life of extractivism at the cost of mass extinction.



Food Sector

Food Sector

Introduction

The global food system—how food is grown, what is produced, and where it flows—accounts for 30 to 50 percent of human-produced GHG emissions and causes severe social and environmental harm.^{79,80,81} Through overreliance on synthetic chemicals and energy-intensive practices, the industrial food chain pollutes our soil, air, and water; threatens vital agrobiodiversity; and harms community health and well-being—all while generating a tremendous amount of waste. As it concentrates power in the hands of corporations, the industrial food chain displaces communities, endangers local livelihoods and diets, and damages humanity's relationship with the natural environment.



The precise contribution of the global food system to the climate crisis is disputed. According to calculations by GRAIN, the global food system—how food is grown, what is produced, and where it flows—accounts for anywhere between 44 and 57 percent of human-produced GHG emissions.⁸² More recent research by the UN Food and Agriculture Organisation (FAO) puts that figure closer to one-third.⁸³ What is clear, though, is that the bulk of the increase in emissions from the food system comes from what the FAO calls “pre- and post-production processes”: manufacturing of fertilizers, food processing, packaging, transport, retail, household consumption, and food waste disposal. These food supply-chain activities are fast becoming the main factor in growing emissions from the global food system, according to the FAO. Such activities are almost entirely caused by the industrialization of the food system under the control of large agribusiness and food corporations.⁸⁴ This is the source of the bulk of increased food emissions.



Harvesting crops, near Jaipur, India. Image courtesy Rawpixel.com.

This chapter demonstrates how transitioning from industrial agriculture to agroecological systems has proven social, ecological, and climate advantages. First, it explores how the root causes of the ongoing climate crisis manifest through the global food system. The chapter then focuses on four solutions that draw from the successes of agroecology: 1) promoting soil health and natural fertilizers; 2) implementing agro-forestry-livestock models; 3) localizing food economies; and 4) uplifting farmer-managed seed networks. These solutions are illustrative rather than comprehensive. They provide a glimpse into the proven ability of agroecology to empower communities, sequester carbon, and restore humans' relationship with the natural world. Grassroots climate solutions in the food sector demonstrate how gender equity, Indigenous sovereignty, public health, local economic vitality, and racial justice are essential to advancing climate action. This chapter then briefly explains the ongoing political and economic threats to agroecology before concluding with two case studies demonstrating the power and impact of grassroots climate solutions.

Context-setting

The root causes of the climate crisis—extractivism, colonialism, white supremacy, and heteropatriarchy—underpin the deeply inequitable and unsustainable industrial food chain that feeds parts of the world today.

While we discuss them separately here for conceptual purposes, in reality they are deeply intertwined with and mutually feed off one another, thereby requiring a holistic, systemic response.

- 1. The extractive economy.** Today's industrial food system is consolidated in a handful of large agribusinesses, with four corporations controlling more than 60 percent of the world's commercial seed supply and another four corporations controlling more than 90 percent of the global grain trade.^{85,86} An analysis conducted in India found that as many as 70 percent of surveyed farmers were under contract by large industrial agribusiness.⁸⁷ Such conditions severely restrict farmers' options, forcing a growing number of them to enter into undesirable wage-labor contracts that mandate environmentally harmful practices such as monocropping, while dispossessing them of land they used to steward. The machinery and inputs required for such practices often necessitate that farmers shoulder large loans, driving them into debt. This economic pressure, combined with worsening crop losses from climate change, is contributing to an alarming pattern of farmer suicides. Free trade agreements tend to exacerbate these conditions by privileging agribusiness and further squeezing out smallholder food producers already on the edge of survival.
- 2. Colonialism.** Colonial legacies ensure that high-income countries' financial and ecological advantages come at the expense of countries that were and continue to be colonized. For example, the monoculture plantation model was a colonial invention that devalued rich, biodiverse foods in pre-colonial economies. It replaced traditional foods with a single set of staple crops for export, such as bananas in Guatemala, oil palm in Nigeria, or cotton in the United States. Oftentimes, slavery and extreme violence were used to ensure profits and to uphold the intertwining of the agricultural economic system with white supremacy. This model continues to have an impact, heightening the vulnerabilities of regional producers limited by monoculture.⁸⁸ Monoculture producers trapped in cycles of dependence and debt are particularly
- vulnerable to corporate land grabs, by which investors expropriate land and displace resident communities. Additionally, neocolonial governments have forcibly pried open domestic markets through a variety of means, such as China guaranteeing loans to debt-distressed countries in Africa in exchange for access to mining concessions. Another example is the \$140 million "food aid" program from the United States to Haiti, which undermined the efforts of Haitian producers that were already struggling to compete with cheap food imports.^{89,90}
- 3. White supremacy.** White supremacist culture has driven the widespread forced assimilation, cultural erasure, dispossession, and genocide of Indigenous peoples, Black peoples, Afro-descendant peoples, and communities of color. Much ancestral knowledge of food cultivation has been decimated and replaced with mass production modes, while that remaining is subjected to cultural appropriation and profiteering via intellectual property rights and ownership models. Corporate agribusiness tools, such as large-scale concentrated animal feeding operations and monoculture plantations, have altered planetary biodiversity by displacing Indigenous, Black, Afro-descendant, and people of color communities.
- 4. Heteropatriarchy.** The agricultural industry has thrived off the patriarchal and heteronormative invisibilization of the labor and leadership of women and gender non-conforming people. There are more than 1.6 billion women farmers worldwide (about 20 percent of the global population), but they own only 2 percent of the land.⁹¹ Violence, militarism, and forced occupation are tools of patriarchy that agribusinesses use to extend their global reach. For example, after securing a contract with the U.S. Department of Defense, chemical company Monsanto helped produce the defoliant Agent Orange, which was later used and tested in Puerto Rico and Vietnam. The chemical infiltrated water systems and airways, severely damaging biodiversity and causing devastating health impacts on children, the elderly, people with disabilities, and women.⁹²

The global food system as we know it today has been largely shaped by the Green Revolution, which industrialized the global food system under the stated premise of addressing world hunger. Large philanthropic funders from the United States contributed to the spread of chemical fertilizers, hybrid seeds, and industrial livestock operations, all oriented toward large-scale monoculture, throughout much of the Global South during the 1950s and 1960s.⁹³ Large-scale agribusinesses, such as the seed companies Hi-Bred (now a subsidiary of DuPont) and DeKalb, secured contracts with implementing foundations to saturate developing markets with their products.⁹⁴ These methods did lead to rapid increases in yields: the world's annual production of cereals, coarse grains, roots, and oil crops more than doubled. The years between 1960 and 2000 saw yields for target countries rise 208 percent for rice, 157 percent for maize, 78 percent for potatoes, and 36 percent for cassava.^{95,96} Studies would later find, however, that the Green Revolution did not reduce poverty, and in many cases increased inequalities, highlighting the major limitations in its singular focus on production as opposed to addressing the root causes of hunger.^{97,98,99}

Furthermore, scaling beyond the Earth's natural limits reaped severe social and ecological costs, which laid bare the Green Revolution's true legacy. One key component of this legacy is the ongoing dependency upon petrochemical-intensive inputs and commercial seed varieties, which means dependency on the corporations controlling them. As mentioned above, in addition to having a host of negative ecological implications, this traps farmers in cycles of debt. In India, often considered the poster child of the Green Revolution, as many as 100,000 indebted farmers committed suicide from 1993 to 2003, prompting a national crisis declaration.¹⁰⁰ Another key component of the Green Revolution is the orientation of agriculture systems away from diverse crops for local consumption toward monocultures of commodity crops for global markets. This negatively impacts local diets, while subjecting farmers and consumers alike to the vagaries of global food price fluctuations. Looking again at India, this country that once had a rich diversity of edible oils is now 70 percent dependent on imports of palm oil and genetically modified soya oil after the Green Revolution.¹⁰¹

Initiatives such as AGRA are continuing the harmful legacy of the Green Revolution. A joint effort between the Gates and Rockefeller Foundations, AGRA (formally known as the Alliance for a Green Revolution in Africa) was formed in 2006 with the promise of reducing poverty and hunger in Africa by increasing crop yields and raising peasant incomes by 2020. Like its predecessor, however, AGRA has failed to feed people and sustain farmers. Yield increases for staple crops preceding AGRA were just as low as in the years prior.¹⁰² The number of hungry people in the countries involved in AGRA has increased by 30 percent, and AGRA has further deepened the debt crisis among African farmers. In Zambia and Tanzania, producers could not repay the loans for fertilizer and hybrid seeds due to poor harvests.¹⁰³ AGRA has also severely restricted the autonomy of peasant producers to grow based on their expertise, drastically heightening farmer vulnerabilities to crop failures, fostering dependency on multinational corporations, and damaging crop biodiversity.¹⁰⁴ Local crop varieties, such as millet and sorghum, were forcibly supplanted by maize, a far less nutrient-rich, culturally appropriate, and climate-resilient crop.¹⁰⁵

About 829 million people globally remain undernourished, bringing into question the so-called success of the Green Revolution.¹⁰⁶ Some consider the Green Revolution a success given its initial contribution to increased global food production, but its top-down approach led to failure. Notably, the Green Revolution serves as a reminder that community-defined solutions—those that deliver holistic, place-based, and contextual transformation—are more likely to result in effective, durable, and sustainable change.

Grassroots solutions in the food sector

Agroecology is a practice, science, and movement that uses ecological concepts and principles to design and manage sustainable agricultural ecosystems with the potential to reduce 490 gigatons of CO₂e by 2050.¹⁰⁷ By design, agroecology returns food production, cultivation, and distribution to natural processes instead of the external inputs employed in the industrial food chain. Agroecological systems refer to bottom-up processes that provide tailored solutions to local problems and honor Indigenous knowledge. Agroecology vests power and autonomy in Indigenous Peoples and local communities, whose long tenure with these methods is the foundation for

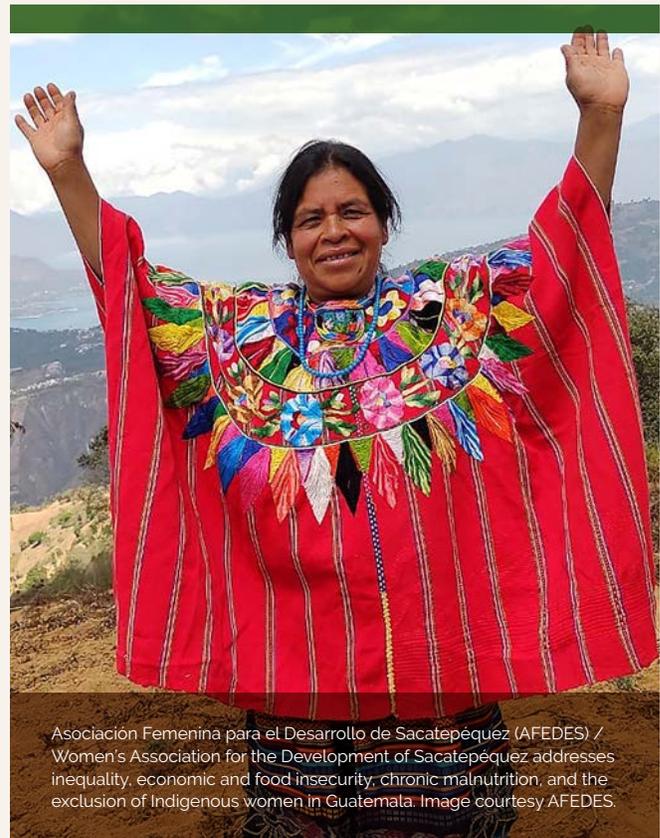
success. Agroecology forms the basic fabric of a globally interdependent food web in which crops, livestock, forestry, ecosystems, and human communities draw sustenance from one another. And agroecology itself is integrally related to the overall food sovereignty movement. As defined by the Declaration of Nyéléni, “food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods and their right to define their own food and agriculture systems. It puts those who produce, distribute, and consume food at the heart of food systems and policies rather than the demands of markets and corporations.”¹⁰⁸

Table 3. Grassroots climate solutions in food production

Strategy	Emissions reduction mechanism	Carbon pool range ⁴	Roughly equivalent to
Agroecology 	Promoting soil health and natural fertilizers, integrating agroforestry-livestock models, localizing food economies, etc.	490 GT CO ₂ e ¹⁰⁹	Emissions from China between now and 2050

Agroecology is essential for feeding most of the world and advancing Indigenous sovereignty and gender equity.

Though Indigenous Peoples comprise just 5 percent of the world’s population, they protect 80 percent of global biodiversity.¹¹⁰ Women and gender-diverse peoples are responsible for 60 to 80 percent of food production in the Global South and at least 50 percent globally.¹¹¹ It is critical to note that the struggle for Indigenous Peoples, women, and gender-diverse peoples’ rights to be recognized and protected is still ongoing, even within the movement for agroecology and food sovereignty. By promoting Indigenous sovereignty and gender equity within agroecology, several other rights can be realized, such as the right to decent work, culturally appropriate and nutritious diets, and racial and economic justice.



Asociación Femenina para el Desarrollo de Sacatepéquez (AFEDES) / Women’s Association for the Development of Sacatepéquez addresses inequality, economic and food insecurity, chronic malnutrition, and the exclusion of Indigenous women in Guatemala. Image courtesy AFEDES.



Women's Empowerment Project, Palestine. Image courtesy Grassroots International.

Agroecology is:



Diversified

Green Revolution-era practices encouraged monoculture and cultivation of just a handful of staple crops. As a result, just three cereal crops—wheat, oats, and barley—provide close to 50 percent of all calories consumed. By utilizing a diversity of crops and livestock via intercropping, rescuing ancestral seeds, and mixed grazing, agroecology can help diversify incomes (reducing dependence on just a few food products), protect biological diversity, and improve health by including a wider variety of nutrients.^{112,113}

Co-generative

Agroecology is a horizontal process in which food producers can share experiences and collectively address various challenges. Critically, co-generation encourages participatory processes.¹¹⁶

Integrated

Agroecology combines and integrates the cultivation of multiple crops (e.g., biological nitrogen fixation in intercropping systems reduces nitrogen fertilizer use). There are also synergies across productive activities (e.g., combining pastoralism and livestock grazing), which help build resilience across the natural ecosystem.¹¹⁹

Resilient

Diversified and efficient food systems have a greater capacity to withstand severe weather events, which are bound to increase in severity and frequency as the climate crisis worsens. Diversified crops and herds of small animals are financial safeguards, as producers no longer depend on a single crop for their income.¹¹⁴ Importantly, agroecology emphasizes a redundancy of roles in which multiple elements in the same system perform essential ecosystem functions. For example, because various species pollinate, a threat to a single species would not impact the entire ecosystem because that role would still be performed. Redundancy helps mitigate the impact across the ecosystem in the face of disruption.¹¹⁵

Cyclical

Agroecological practices of nutrient recycling help increase resource-use efficiency and minimize waste. For example, aquatic animals help fertilize rice crops, reduce pests, and reduce the need for fertilizers or pesticides.¹¹⁷ The industrial chain discards food scraps and considers manure as "waste." In contrast, these outputs are fed into the loop to nourish the soil in an agroecological system.¹¹⁸

Communally governed

Because agroecology is a horizontal and community-cultivated process, there is greater collective accountability and shared governance capacity. Participatory approaches engender trust and reciprocity. They create optimal conditions for inclusive and equitable resource governance. Agroecological traditions that have historically originated with women, Indigenous Peoples, youth, and farmers elevate their leadership, and center relationships with their territories and the Earth.

⁴ Ranges are presented under a 2050 scenario.

Promoting soil health and natural fertilizers



Asociación Femenina para el Desarrollo de Sacatepéquez (AFEDES) is promoting food sovereignty and preserving Indigenous knowledge and skills in Guatemala. Image courtesy AFEDES.

Agroecological practices enhance soil health while offering powerful opportunities to promote food sovereignty, sequester carbon, and disrupt the agrochemical industry. Through agroecology, local and Indigenous peasant communities use their deep, experiential knowledge to tend their soils successfully. By way of polycultures, producers draw from a diverse mix of crops to build resistance to soil pests and complement the uptake of soil nutrients and water to facilitate the recycling of biomass and nutrients.¹²⁰ Cover cropping—in which leguminous crops are grown to provide permanent soil cover—adds organic, enriching matter to the soil while fixing atmospheric nitrogen.¹²¹ Agroecological practitioners close the nutrient loop by repurposing manure and organic compost as fodder for local soils, simultaneously minimizing waste.¹²² Rebuilding soil health through nutrient cycling and natural fertilizers on a total of 380 to 817 million hectares of farmland by 2050 will avoid nitrous oxide emissions equivalent to 2.3 to 12.1 gigatons of CO₂, equivalent to the carbon currently sequestered by half the global forest stock.¹²³

By comparison, industrial agriculture's reliance on chemical fertilizers and pesticides has stunted the natural environment, damaged planetary biodiversity, and degraded soil health. The documented impact of fertilizer and pesticide use on human health is extensive; about 385 million non-fatal pesticide poisonings have been estimated yearly, with approximately 11,000 deaths.¹²⁴ Overuse of fertilizers and pesticides contributes to planetary warming as remaining soil bacteria convert nitrate fertilizers into nitrous oxide, 289 times more potent than CO₂ in its warming effect over 100 years.¹²⁵ Currently, synthetic fertilizers contribute significantly to total agricultural carbon emissions, accounting for 1,250 MT of CO₂e in 2018, roughly 21.5 percent of annual direct emissions from agriculture. For context, global emissions from commercial aviation in the same year were 900 MT of CO₂e.¹²⁶



Women farming cassava in Sierra Leone. Image Courtesy Annie Spratt, Unsplash.

Organic, peasant-centered practices protect the global food web from geopolitical stressors driven by fossil fuel demand. In addition to the emissions from petrochemical fertilizers released after they are applied to the soil, some 40 percent are released through the production and transport of fertilizers, mainly in the form of CO₂ caused by the burning of fossil fuels during manufacturing.¹²⁷ Global demand for petrochemicals has fueled the rise of the military-industrial complex as countries have waged war over finite petrochemical resources. Even if the large-scale agricultural industry were to adopt organic farming, it still would not solve the underlying problems related to biodiversity preservation, the rights of Indigenous Peoples, and land-use change. Restoring and defending the rights of peasant communities, gender-diverse producers, and those economically disenfranchised is essential to rebuilding the soil health that enables climate mitigation.

Organic agriculture and integrated pest management in West Bengal ¹²⁸



The group Maa Durga organizes landless women farmers who work as agricultural laborers in the biodiverse region of West Bengal in India. Farmers observed that heavy reliance on chemical fertilizers and pesticides degraded soil health, simultaneously depleting the stock of crops and livestock—including edible weeds, fish, frogs, and crabs—raised on the paddy fields and worsening drinking water quality. The organization has helped more than 150 women farmers strengthen their food security and integrate organic agriculture practices to reduce their dependence on toxic fertilizers and pesticides. Members of the group have learned how to implement organic agricultural practices that reduce reliance on toxic chemicals and pesticides. Among their various techniques, members commonly employ alternative pest management systems, in which natural materials such as cow dung and neem leaves are used in place of manufactured pesticides. Members compost from food scraps to create natural, nitrogen-rich fertilizers to enrich soils. The Maa Durga program also organizes a camp for participants to learn and raise awareness about the harmful effect of fertilizers and pesticides. Off the field, the group has participated in local governance councils to strengthen women members' lands rights.

Integrating agroforestry-livestock models

Agroforestry protects forests and integrates trees and shrubs with crops and livestock in agricultural systems.

The mitigation potential is significant; according to the Sixth IPCC Assessment, the mitigation potential of “agroecologically improved cropland and grazing land management” is estimated to be 2.8 to 4.1 gigatons of CO₂e per year.¹²⁹ For example, the Pari Women's Development Association in Papua New Guinea mobilized hundreds of people to restore an area of mangrove forest along the coast of the Pari village. The Association purchased more than 500 mangrove seedlings, provided training on which species of mangroves thrive in different zones, and established resource-monitoring systems to ensure the health of mangrove forests.¹³⁰ These efforts were particularly transformative for women in the community, as mangrove forests are prime hunting grounds for women to gather mud crabs and kina shells to sell at local markets.¹³¹ By restoring mangrove habitats on the Pari coast, the Association ensured the local incomes of women villagers and sequestered about three times the carbon of tropical forests in Papua New Guinea.¹³²

Silvopasture integrates livestock with surrounding natural systems, with immense mitigative potential.

Silvopastoral systems promote ecological interactions that produce environmental and economic benefits by increasing yield per unit area, improving resource-use efficiency, and enhancing ecological health. Industrial farming practices typically have livestock graze in open grasslands or feedlots, leading to clear-cut forests and reducing farmlands' carbon sequestration potential. The impact on Indigenous farmers, many of whom ascribe specific cultural and

economic importance to forests, is particularly detrimental. Silvopasture manages trees, pasture, and livestock under a single system in which livestock may graze in wooded areas. Trees provide shade for livestock and serve as sinks to absorb methane released by ruminants.¹³³ Farm incomes can be increased or diversified—directly through increased sales of animal or forestry products and indirectly through enhanced soil health and improved animal welfare.¹³⁴ Silvopastoral approaches have an outsized impact on curbing carbon emissions; Project Drawdown estimates that if the adoption of silvopasture expands from the current 550 million hectares to 772 million hectares by 2050, CO₂ emissions will be reduced by 26.6 to 42.3 gigatons.¹³⁵

Agroforestry approaches, including silvopasture, would facilitate the just and sustainable production and consumption of meat and dairy.

In the Global South, livestock is raised by more than 630 million peasant farmers, most of whom draw upon low-emitting, mixed farming, and intercropping methods, while another 200 million herders graze their animals in areas where crops are not grown.¹³⁶ By raising crops and livestock together, livestock waste is repurposed as a natural fertilizer to enhance soil health for crop cultivation, and crops provide natural feed for livestock.¹³⁷ The FAO estimates that global meat production generates more GHG emissions than all the world's transport combined.¹³⁸ About 56 million hectares of land were cultivated for animal feed in the first decade of the 21st century.¹³⁹ Clearing pasture lands for farmers to raise cattle for beef production contributed to 41 percent of deforestation worldwide in 2021.¹⁴⁰ In sum, an agroecological transition would respect the importance of sustainable pastoral lifeways and allow consumers to include meat and dairy in their diets in ways that respect the ecological limits and socioeconomic needs of the planet and communities.

Localizing food economies

Agroecological systems emphasize local food production and consumption, shortening the circuit between consumers and food producers. Local markets are the primary platform for peasant farmers, pastoralists, and fisherfolk to sell their surplus fares to customers. Interactions between producers and consumers in local markets give consumers access to nutrient-rich and biodiverse foods not available at a supermarket.

With its circular nature and drive to feed everyone, agroecology answers the global food waste challenge. The global food waste footprint currently accounts for 1.6 gigatons of emissions, or 9 percent of total global GHG emissions.¹⁴¹ Agroecological systems close the waste loop by repurposing animal and crop byproducts for various uses. Shorter food miles guarantee fresher foods that will not spoil before they reach the consumer.⁵ In many regions, 30 to 40 percent of loss occurs after food products reach the consumer.¹⁴² By shifting away from global food circuits toward local and affordable food economies, agroecology can significantly decrease the amount of food loss and waste.

Table 4. Distribution in the industrial food chain

	Share of global GHG emissions ^{143,144}	Carbon pool ¹⁴⁵
Transportation 	5%	0.8 tonnes of CO ₂ e
Pre- and post-production (processing, packaging, retail, refrigeration) 	15%	2.8 tonnes of CO ₂ e
Waste 	9%	1.6 tonnes of CO ₂ e
Total	29%	5.2 tonnes of CO ₂ e

Other social and environmental impacts are associated with the global industrial food system that agroecology addresses. Vehicle fleets and processing facilities generate noise and light pollution in neighboring communities. Food packaging is used and later discarded in landfills, open dumps, or nearby water sources, harming water quality and marine biodiversity. The transboundary nature of food production diminishes economic benefits and the ability of local food producers to sell fresh, affordable, and homegrown foods in local markets. Transportation, refrigeration, and food storage combined will contribute 57.6 gigatons of CO₂ by 2050.¹⁴⁶ Though agroecology may not wholly eliminate the need for transport or refrigeration, a shift toward local food production can help significantly curb these emissions.



Local produce market. Image Courtesy Lucian Coman, AdobeStock.

⁵ "Food miles" refer to the distance food travels from production to the end consumer.

Defending seed sovereignty and farmer-managed seed systems

Seed sovereignty enables farmers to save and exchange seeds that have been passed down for generations and play an active role in the breeding, selection, management, processing, storage, and conservation of seeds. Farmer seed systems are the bedrock upon which food systems and genetic and cultural biodiversity rest. For many smallholder farmers, seed saving and exchange are integral to their food systems. Smallholder farmers on the African continent source more than 90 percent of their seed from what they have saved, their communities, and local markets.¹⁴⁷ Because the nature of seed exchange is so deeply communal, farmers know where their seeds are being sourced from, their productivity (because the seeds are grown locally), and their adaptability to the local ecosystem. By contrast, the prevailing corporate seed system—in which just four large agrochemical companies control 60 percent of the global seed market—is dedicated to the mass production and export of homogenous seed varieties that are ill equipped to adapt to different and changing climates. At least 25 to 30 percent of commercially certified seeds do not germinate or are considered fake.¹⁴⁸

Seed sharing promotes several social and ecological benefits. Commodity seed systems have pushed smallholding farmers into debt, as many cannot afford to buy the expensive seeds and other synthetic inputs they require (i.e., fertilizers, pesticides) or are forced into debt by incurring the costs of crop failures.¹⁴⁹ Because of the industrial commodity seed system, approximately 75 percent of plant genetic diversity has been lost as farmers have been forced to abandon local varieties for uniform varieties.¹⁵⁰ Farmer-managed seed systems are far more affordable, if not free. Restoring and protecting farmer seed networks enables the recovery of endangered crop varieties and deeper community trust while maintaining economic benefits in the community. As such, when farmer seed systems are challenged or poorly supported, nothing less than the rights to life and livelihoods are undermined. The more food systems acknowledge, honor, and defend farmers' rights to seed, the more likely the systems will fulfill people's basic rights.

Seed sovereignty is also a critical climate resilience strategy using trusted, locally adapted seeds. In the face of climate-induced stressors, peasant farmers can respond by harnessing local Indigenous seed varieties that are drought resistant and can quickly adapt to changing environmental conditions. Farmers in Zimbabwe are now producing local, drought-tolerant varieties of crops such as pearl millet, finger millet, sorghum, and cowpeas.¹⁵¹

Seed diversity and sovereignty in Zimbabwe



In Zimbabwe, local farmers' varieties provide more than 70 percent of the country's staple foods in various forms. Zimbabwe Smallholder Organic Farmers' Forum (ZIMSOFF) is a national organization that promotes agroecology and builds food sovereignty through clusters of local smallholder farmers' organizations (SFOs). ZIMSOFF now consists of four clusters with more than 19,000 members and an average of 15 SFOs per cluster. Through ZIMSOFF, farmers have learned about seed diversification; sustainable soil management; and seed saving, storing, and sharing. Using Indigenous seeds helps to cultivate culturally appropriate, nutritious food that reflects farmers' rich cultural heritage. Additionally, these seeds are significantly less expensive than corporate seeds because farmers save and exchange seeds. Finally, though women farmers in Zimbabwe are seldom adequately acknowledged for their contributions, women play a pivotal role in ZIMSOFF, from farming to creating the ZIMSOFF strategic direction. ZIMSOFF has helped influence policymakers (e.g., Ministry of Agriculture, Ministry of Health, Parliamentary Commission on Climate Change) to recognize Indigenous seeds and food as valuable assets for Zimbabwe. ZIMSOFF also hosted the International Operative Secretariat of the global peasant movement La Via Campesina (LVC) from 2013 to 2021. The contributions of ZIMSOFF to food systems, gender equity, and climate resilience demonstrate how grassroots efforts scale and address multiple systems of oppression. Grassroots solutions inextricably link climate mitigation and adaptation work with societal and structural benefits for communities.

Table 5. Examples of grassroots climate solutions in agroecology

Strategy	Emissions reduction mechanism	Carbon pool range ⁶	Roughly equivalent to
Promoting soil health and natural fertilizers 	Restoring soil health, reducing the production and transport of petrochemical fertilizers	2.3 to 12.1 GT CO ₂ e ¹⁵³	Half the current global forest stock
Integrating agroforestry-livestock models 	Integrating livestock and aquaculture management with forestry, reducing deforestation	26.6 to 42.3 GT CO ₂ e ¹⁵⁴	Yearly global emissions produced from human activity
Localizing food economies 	Shortening food transportation and storage needs, minimizing food waste	57.6 GT CO ₂ e ¹⁵⁵	U.S. GHG emissions produced for nine years
Uplifting farmer-managed seed networks 	Restoring soil health, reducing water use, eliminating food waste from crop failures	<i>Data currently unavailable</i>	<i>Data currently unavailable</i>

Threats to success

Commercial interests threaten the practice and spread of agroecology. Well-resourced commercial groups (e.g., fertilizer companies, loggers, food processing and packaging companies) strategically consolidate decision-making power (via lobbying, interest groups, bribery, corruption, etc.) and land ownership (via land grabs) to quash grassroots dissent. Government policies deeply influenced by corporate lobbying have been weaponized against grassroots food solutions. Intellectual property rights regimes that protect agribusinesses have co-opted Indigenous and local knowledge for profit and criminalized agroecological practices, such as seed saving, sharing, and exchange. For example, the World Trade Organization's Trade-Related Agreement on Intellectual Property pushed states to join the Union for the Protection of New Varieties of Plants, which protects the rights of industrial

plant breeders and limits farmers' rights to freely use and exchange their seeds.¹⁵⁶ Other government policies, such as free trade agreements that privilege globally traded agribusiness commodities, have undermined the economic sovereignty and security of agroecologists worldwide.

The lack of formal protections for farmers and people who work in agriculture also challenges the long-term tenure of agroecology. The nature of agroecology is decentralized, shifting power away from large-scale industrial actors and back to frontline communities. However, with weak and often politically compromised state protection of farmers' and farm workers' rights, advocates for agroecology are subject to violent means of resource appropriation by state and state-sanctioned actors.¹⁵⁷ A recent example is the 2020 farmers' protests in Punjab against the minimum support price rule. The Indian national government passed a series of agricultural

⁶ Ranges are presented under a 2050 scenario.

reforms, one of which indirectly abolished minimum support price laws that served as a floor for farmers' crops. Protests erupted, as these laws would have forced smallholder farmers to sell their crops to large agricultural producers at lower prices, thereby pushing farmers off the land. However, a coalition of farmers, students, Indigenous peoples, and Dalit peoples successfully forced the government to repeal the farm laws in 2021.¹⁵⁸ It is common for agricultural stewards fighting against industrialized agriculture and the associated harms to constantly endure danger, intimidation, and violence.



West Africa. Image courtesy Riccardo Niels Mayer, AdobeStock.

Case Study #1:

Amplifying the leadership of women farmers in West Africa

Women are pivotal agricultural stewards, accounting for nearly half of the world's smallholder farmers. In Africa, women farmers produce 70 percent of the food. Despite their protection of waterways, land, territory, soil, and seed, women and girl farmers account for most of the African continent's hungry people.¹⁵⁹ They are uniquely vulnerable to the threat of climate change. Furthermore, the Green Revolution ushered in an era of technologies and practices that displaced women from their roles in local food systems and amplified their vulnerabilities.

In response to the threats from the Green Revolution and industrial agriculture, **Nous Sommes la Solution/ We Are the Solution (NSS)** amplifies women's key role in sustainable, smallholder farming.

In 2009, 12 grassroots women's farmer organizations from across West Africa launched NSS to promote agroecology and women's leadership in the food sovereignty movement in Africa and to end the promotion of the so-called Green Revolution across Africa.¹⁶⁰ NSS supports the leadership of women farmers by providing training and access to knowledge exchange networks so members can continue sharing and developing agroecological practices in their communities. In addition, the movement builds coalitions with national, regional, and international networks; conducts popular education; and advocates for policy to create a more enabling environment for agroecology and peasant feminisms to flourish. Since its establishment, NSS has grown its membership to more than 500 rural women's associations across Senegal, Ghana, Burkina Faso, the Gambia, Guinea-Bissau, Guinea, and Mali.¹⁶¹

The movement has four core objectives:

- Promote food sovereignty by encouraging the transmission of Indigenous knowledge from generation to generation
- Preserve Indigenous seeds and promote culturally appropriate and nutritious diets
- Implement national policies that are favorable to smallholder agroecological farming
- Lobby governments to support local food production and wean off imports

In Casamance, a southern region in Senegal, the NSS network comprises nearly 10,000 women in more than 100 rural women's associations.¹⁶² The movement coordinates robust programming to exchange knowledge on agroecological stewardship and organizes farming associations to purchase and collectively manage farmland.¹⁶³ Currently, the region has a model farm and a community store to sell products grown from local lands by women smallholder farmers. The women farmers have successfully produced and marketed sustainable biofertilizers for use on farms.¹⁶⁴ NSS leaders are currently lobbying the Senegalese government to overturn a law that prevents farmers from using local seed varieties and are building greater legislative support for ecological agriculture. The multifaceted work of NSS shows how sustainable food production and social justice are deeply intertwined.

Case Study #2:

Upholding Indigenous forest tenure in Central Indonesia

“Justice is to be seized. Justice is not to be expected.”

— Eva Bande, People's Front for Central Sulawesi Oil Palm Advocacy

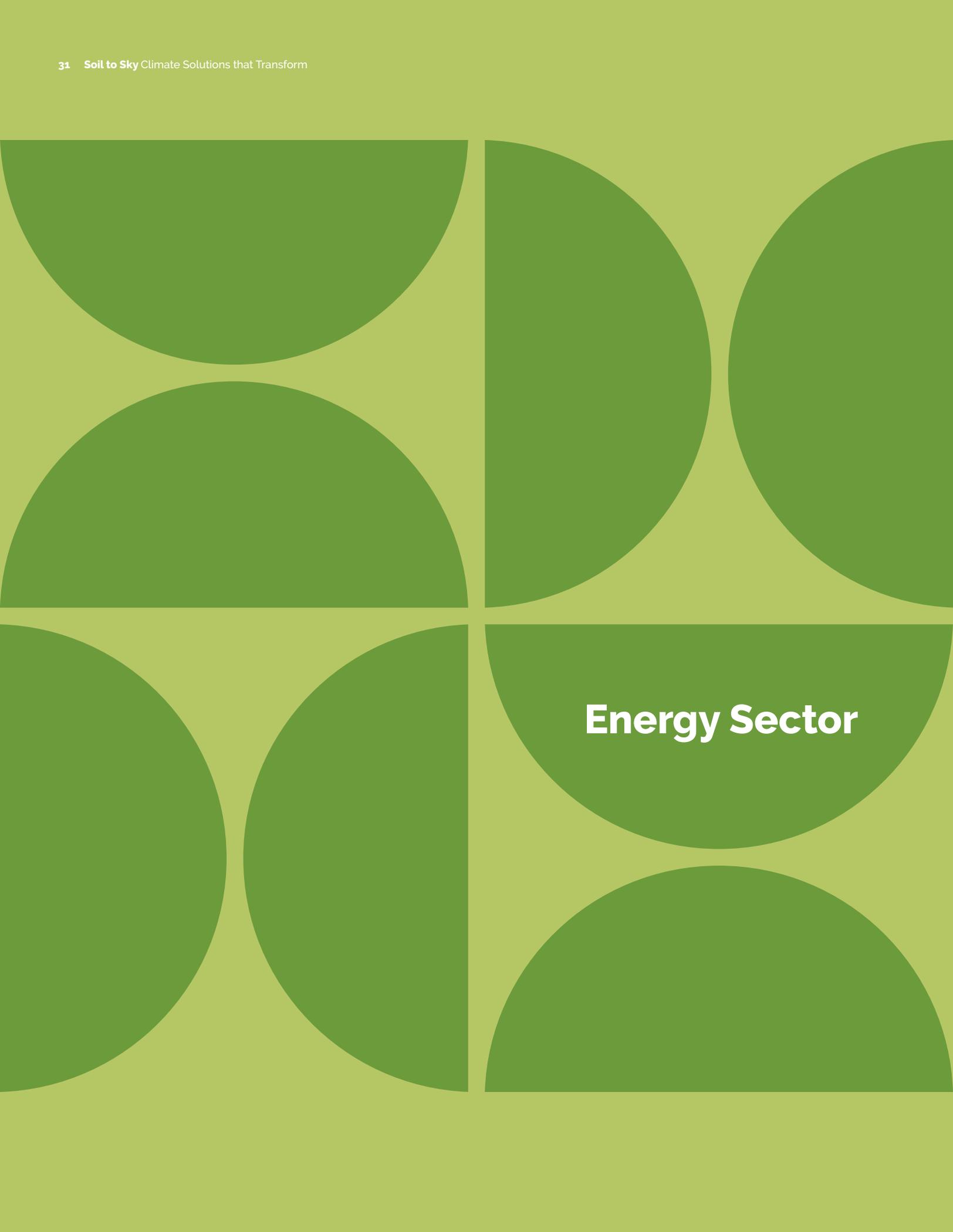
Enshrining the sovereignty of Indigenous Peoples and local communities is critical to successfully protect and defend cultures, livelihoods, and land. Indigenous land management practices have been practiced for centuries, demonstrating their success and stability in a rapidly changing environment. Strengthening and expanding Indigenous Peoples' rights to manage their territories would reduce between 8.69 and 12.93 gigatons of CO₂ emissions, equivalent to the emissions produced from 15 trillion tons of burned coal.^{165,166} Though deforestation worldwide contributes as much as 30 percent of global GHG emissions per year, Indigenous-stewarded forests remain protected. For example, the deforestation rate inside woodlands where Indigenous land tenure is recognized is 2.8 times lower than outside areas in Bolivia, 2.5 times lower in Brazil, and two times lower in Colombia.¹⁶⁷

Embracing and defending Indigenous territory rights can fundamentally transform the relationship between humanity and the living environment. Territorial sovereignty is critical for Indigenous forest-dwelling peoples, for whom histories, traditions, and diets depend on secure access to forestland. Critically, though they vary by community, Indigenous groups value reciprocity and harmony with the natural landscape; Indigenous groups recognize humanity as part of a broader network of connections that includes all living things.¹⁶⁸ This practice of mutual care and respect for the natural environment has enabled successful land and water stewardship and is central to broader Indigenous resistance to land theft by colonial governments and the agricultural industry.

Indigenous leadership displayed by the Piondo Farmers Union was borne out of resistance to corporate theft of forestland. In 2009, PT Berkas Hutan Pusaka (BHP), a large industrial palm oil producer, seized 1,500 hectares of land around the Piondo Village, which is home to the Ta'a Tribe. Without consulting the neighboring peasant farmers, PT BHP logged the trees to convert the land into a palm oil plantation, which had devastating impacts on neighboring communities who could no longer access the forests and also produced significant increases in emissions.^{7,169} In response, the villagers formed the Piondo Farmers Union to organize demonstrations and occupations on industry-seized land. In May 2010, 24 Piondo Farmers Union members, including community organizer Eva Bande, were arrested while peacefully protesting an unauthorized palm oil development and imprisoned for four years.¹⁷⁰ Upon Bande's release, she founded the People's Front for Central Sulawesi Palm Oil Advocacy to reclaim and restore the forestland.

Through Bande's organizing efforts and the collective will of the Ta'a Tribe, the People's Front has successfully reclaimed and rehabilitated forestlands, reaffirming the importance of local and Indigenous stewardship. The People's Front maps the areas within Central Sulawesi that are illegally occupied by the palm oil industry and then prepares its members to re-occupy the land. Once reoccupied, the members of the Front use several agroecological practices to restore the forestlands. Members plant a variety of species to absorb excess water and rely on natural fertilizers to help production. Furthermore, they use communal forest governance principles to create a boundary between the forestlands and their homes, which enables them to protect the forests while growing food to sustain their communities. In total, the work of Bande and the Front has restored 500 hectares of unauthorized plantations into forestlands or small-scale organic farms. Restoration has sequestered approximately 100,000 tons of CO₂, equivalent to the emissions produced by 11 million gallons of oil. More than a decade after their resistance began, the Farmers Union and the People's Front still lack state-recognized claims to the land they have stewarded for generations, but that hasn't diminished their resistance. Despite ongoing government and industrial land theft, frontline leadership has forged a new collective vision grounded in solidarity and community that is steadily gaining momentum. Its member communities continue to work toward a more just agrarian future.¹⁷²

⁷ It is estimated that in 2010 alone, land-clearing for oil palm plantations in the Kalimantan region of Indonesia emitted more than 140 million metric tons of CO₂—equivalent to annual emissions from 28 million vehicles.



Energy Sector

Energy Sector

Introduction

When considering all energy consumption, 80 percent derives from fossil fuels, the combustion of which accounts for 75 percent of GHG emissions globally.^{8,173}

Notably, about a third of those emissions come from the electricity sector, yet nearly 14 percent of people worldwide lack access to electricity.¹⁷⁴ The exploration, extraction, processing, and use of coal, oil, and natural gas (the fossil fuels powering global energy systems) have caused unprecedented global impacts. The high concentration of wealth and power in current fossil fuel energy systems has underpinned a global geopolitical system characterized by conflict, human rights abuse, and environmental catastrophe. It is essential to address energy needs and the climate crisis in ways that refocus human relationships with the natural world and each other.

This chapter focuses on how transitioning from centralized, fossil fuel-based energy systems to democratized community-based renewable energy can positively impact both people and the climate. First, it explores how the root causes of the ongoing climate crisis have influenced the global energy system. The chapter then focuses on two central grassroots climate solutions: 1) preventing harm from resource extraction and 2) promoting community access and governance of renewable energy. The proposed solutions for decarbonizing and decentralizing energy systems have the potential to sequester significant amounts of carbon while ensuring energy production consistent with the rights of nature and human rights. Grassroots energy solutions challenge the idea of energy as a commodity and work to stay within ecological limits. The chapter briefly explains the threats to these solutions and concludes with two case studies.

“A peoples’ energy transition is not simply a change in the energy matrix, or a decision about which technological options to adopt. Rather, it is centered on discussing and transforming power relations.”

— Transnational Institute¹⁷⁵

Context-setting

Our entire global economy is based on the procurement of energy. The way we choose to transition to a new carbon-free, democratized energy economy based on the sun and wind could alter economic fundamentals and even geopolitics for the future. Right now, we procure energy through transnational private corporations with immense power, whose economic logic values profits over people and the planet. Fossil fuel extraction connects to the colonial legacy of removing and commodifying nature's assets (in this case, coal, oil, and natural gas) in the name of development. Energy systems dependent on fossil fuels continue to justify the extraction of natural resources as necessary for global development, yet the most recent IPCC report clearly asserts this is unnecessary to alleviate poverty. The extraction and resultant pollution of fossil fuels have the most severe consequences in the Global South, while those who benefit mostly reside in the Global North. Fossil fuel dependence replicates and repackages colonial models of extraction under a new transnational corporate logic that operates outside national laws, often with impunity. This logic harms the well-being of occupied and oppressed communities, and also the well-being of the planet. The elements that sustain most centralized energy systems (e.g., research and development, infrastructure, machinery, regulations, funding) work in favor of and are controlled by transnational corporations or colonial powers.¹⁷⁶ For example, the fossil fuel industry benefits from subsidies amounting to \$11 million every minute.¹⁷⁷

Extractivism creates immense harm to host communities.

Communities worldwide, particularly in the Global South, are increasingly facing resource wars and forced migration due to the extraction, production, and transportation of fossil fuels. Communities dependent on resource extraction, which helps maintain Global North lifestyles, typically suffer from resource-curse economies (i.e., places with abundant natural resources are exploited by foreign interests at the expense of local communities).¹⁷⁸ Additionally, communities near extraction sites endure some of the worst public health conditions.¹⁷⁹ Extraction leads to intensified regional and global wars, increased militarization, and more refugees. Indigenous Peoples, children, and women are particularly impacted by energy extraction. For example, Peru's Health Ministry estimated that 98 percent of children in Indigenous communities who reside in one oil-producing region of the Peruvian Amazon have high levels of toxic metals in their blood.¹⁸⁰

⁸ Energy consumption includes the use of fuels for transport, heat, steam production, the generation of electricity, all manufacturing, and industry.



Oil rigs. Image courtesy Chepko Danil, AdobeStock.

Large-scale, centralized (often foreign-owned) fossil fuel conglomerates and power companies promote their models as efficient, yet fail to provide reliable energy and do not challenge fossil fuel consumption or corporate power. The industrial development model pushed by large companies and imperial powers reinforces the idea of limitless growth and the centralization of power.¹⁸¹ Large-scale energy systems have severe environmental impacts due to their size and the resources required to transmit mass-produced energy over long distances. Dependence on centralized energy systems creates domino effects when there are failures; natural disasters are a notable example of this phenomenon. Climate change is projected to increase energy outages from extreme weather, which are already taking a toll on communities worldwide. Key mitigation strategies focus on improving the technical efficiency of fossil fuel production (e.g., minimizing energy intensity, enhancing production and resource efficiency), rather than replacing fossil fuels. Current efforts by mainstream environmental organizations and philanthropic funders rarely stop new drilling or pipelines, even though the International Energy Agency has stated that fossil fuel moratoriums are essential to meet emission targets.¹⁸²

The oil and gas industry is turning to petrochemical production to drive future fossil fuel extraction and dependence. Petrochemical products (e.g., plastics, synthetic rubber, detergents, adhesives) represent the most significant growth opportunity for the oil and gas industry—and a financial lifeline, with single-use plastic driving 40 percent of the industry's growth.¹⁸³ Given its current trajectory, the global petrochemical industry will emit up to 1.34 gigatons of emissions a year.¹⁸⁴ Petrochemical production will consume 10 to 13 percent of the remaining global carbon budget if unaddressed by 2050. Furthermore, the industry is pushing plastic consumption and distribution along with the importation

of plastic waste for processing in Global South countries without waste management systems, such as Kenya, which will increase emissions and worsen inequities for local communities.¹⁸⁵

Grassroots solutions in the energy sector

Grassroots climate solutions strive for a livable planet by phasing out extractive economies and advancing energy sovereignty. The world needs to stop extracting and burning fossil fuels. Transitioning from a fossil fuel-based energy system will require reducing net energy demand, establishing decentralized community governance of renewable energy, and improving ecosystem protection alongside agroecological land management.¹⁸⁶ Reducing fossil fuel consumption is likely the most challenging and controversial aspect, as it will require lifestyles to be less energy intensive, particularly in the Global North and high-income countries where energy demand per capita is three times higher than the Global South.^{187,188} Because industrialized agriculture is energy intensive, the energy transition must be co-designed with those leading the proliferation of agroecological production systems (e.g., peasant farmers, small-scale fishers, and pastoralists). Transitioning to a cooler planet will necessitate alignment and collaboration across social movements of rural and urban workers and address the significant implications for workers in energy-related jobs.¹⁹⁰

De-commodifying energy and creating resilient energy systems at the community level will be a critical part of living sustainably within planetary boundaries. Lack of reliable access to energy remains a significant source of poverty, inequality, and insecurity for millions worldwide.¹⁹¹ It is increasingly recognized that access to safe energy is essential for overcoming poverty and promoting

development.¹⁹² Energy democracy allows communities to take control of energy resources and use them to empower themselves.¹⁹³ It is critical to de-commodify energy to ensure that communities and workers have the power they need to live and thrive within the planet's limits.^{194,195} Energy transitions in the Global South may be particularly challenging given the legacy of colonialism, of which

debt is an ongoing aspect. This constrains the ability to obtain the resources, capital, and technologies needed to secure access to fossil fuel alternatives. The path forward must consist of safe and affordable renewable energy production that ensures community participation and governance of energy production and distribution.

Table 6. Grassroots climate solutions in energy production

Strategy	Emissions reduction mechanism	Carbon pool range ⁹	Roughly equivalent to
Preventing harm from resource extraction 	Keeping fossil fuels in the ground; eliminating emissions from resource extraction	1,300 GT CO ₂ e ¹⁹⁶	Standing stock of all global forests
Community access to and governance of renewable energy 	Reaching 100 percent global renewable energy; decentralizing energy systems	196.8 to 420.6 GT CO ₂ e ¹⁹⁷	6 to 13 years of global energy emissions

“Indigenous resistance to carbon is both an opportunity and an offering—now is the time to codify the need to keep fossil fuels in the ground, to safeguard both the climate and Indigenous Rights.”

— Indigenous Environmental Network¹⁹⁸

Grassroots efforts to terminate hydrocarbon extraction can prevent the release of 1,300 gigatons of CO₂e by 2050.¹⁹⁹ To avoid harm to people and nature and phase out resource extraction, grassroots groups deploy various approaches, including reducing energy consumption, blocking top-down energy projects responsible for the forced displacement of people, removing fossil fuel subsidies, stopping new fossil fuel extraction and infrastructure, holding energy companies and governments accountable, promoting divestment from fossil fuels, and advancing just and renewable alternatives.²⁰⁰ For example, by organizing, protesting, and demanding that the government cancel extraction projects, communities

in Portugal have effectively stopped the country's existing fossil fuel contracts.²⁰¹ The country closed the last two remaining extraction contracts in summer 2020, and the last coal plant was shut down the following year.^{202,203} This campaign involved lengthy legal processes and coordinated pressure on companies and investors. A recent analysis of energy conflict cases demonstrated how grassroots movements transform resource governance (e.g., project approval processes, scope alterations, legislative changes, and legal precedents).²⁰⁴ Indigenous communities leading resistance to extraction in Canada are credited with significantly influencing the country's broader resource decision-making.²⁰⁵

Grassroots movements activate communities impacted by extraction and strategically coordinate action.

Indigenous Peoples and communities who face similar intimidation and harm from governments and companies find allyship with one another and share expertise. In the short term, movements often engage in civil disobedience to stop hydrocarbon projects. Over the longer term, they use multiple strategies to ensure the permanent cancellation of such projects.²⁰⁶ In preventing harm to local communities impacted by extractivism, grassroots movements build capacity and strengthen climate action in other places.

⁹ Ranges are presented under a 2050 scenario.

Preventing harm from fossil fuel extraction includes consideration for just energy transitions. Movements opposing extractive industries have effectively created financial liabilities that reduce fossil fuel infrastructure development. For example, grassroots resistance against specific extractive industries in one region can deter similar developments in different regions. Given the risk of leakage (i.e., the extraction or production that does not happen in one area could occur in another), it is critical to support movement efforts to coordinate translocally. Additionally, the impact of energy transitions on local economies, jobs, and workers' rights is a significant concern. Direct resistance to extraction must be accompanied by efforts that secure worker rights and decent work.²⁰⁷ Just transition is a framework for place-based principles, processes, and practices that build political and economic power to shift from extractive economies to regenerative ones.²⁰⁸ A just energy transition must be equitable, redress past harms from extraction, and create new power dynamics that include local communities, meaning both the outcome and process are critical elements.²⁰⁹ A few months ago, more than 30 international trade unions signed the "Trade Union Program for a Public Low-Carbon Energy Future," an effort to leverage the global trade union movement to bring fundamental changes in climate and energy policies.²¹⁰

Community access and governance of renewable energy

The transition toward 100 percent renewable energy must also restructure how we produce, store, and distribute energy. Although mainstream environmental organizations and philanthropic funders agree on the need to transition to renewable energy, their approach tends to prioritize industrial models that rely on highly centralized, capital-intensive technologies. The development and expansion of renewable energy systems must be decentralized and democratized.²¹¹ Otherwise, they will be extensions of the fossil fuel economy and continue unreliable and potentially harmful energy distribution.^{212,213} For example, hydropower is a source with significant social and environmental implications, such as flawed ecosystem impact assessments, lack of recognition of human rights, forced displacement of communities, and insufficient or nonexistent community consultation.²¹⁴ Grassroots groups are directly challenging privatized energy by promoting community access and governance of renewable energy. Strategies include shifting the administration of planning processes, zoning decisions, regulations, and siting of energy projects to communities and creating compensation and reparations for communities impacted by fossil fuel infrastructure.²¹⁵ This approach also helps prevent the ecological degradation, environmental racism, and worker injustice typical in large-scale fossil-fuel-based energy systems.²¹⁶



La Madre Tierra, a 20-foot high giant puppet created in partnership with El Puente at the People's Climate March in New York City in 2014. The puppet exalts the people to defend our Mother Earth. Image courtesy Grassroots International.

Locally owned and operated renewable energy presents significant benefits for communities, with the potential to mitigate 196.8 to 420.6 GT CO₂e by 2050.²¹⁷

Diversified and decentralized energy can reduce vulnerabilities to climate change, especially in rural populations.²¹⁸ Energy production at the community level requires using local geophysical resources, which are inherently more sustainable than relying on a globalized supply chain if used sustainably. Communities are protected from external price fluctuations, and local governance creates the possibility for more just distribution and infrastructure placement. Community access to renewables can result in income generation, lower energy bills for individuals, improved local economies via job creation, and opportunities for new community businesses.²¹⁹

Microgrids are an opportunity to equitably meet energy needs and reduce emissions. Microgrids are localized systems that generate and distribute energy and increase energy flexibility and efficiency. These qualities make them more resilient to extreme weather, as they are stand-alone entities.²²⁰ The International Energy Agency finds that more than 50 percent of people in rural and remote

places without electricity would be best supplied by mini or microgrids.²²¹ Kerosene is the primary fuel for lighting across roughly 300 million homes globally.²²² Studies have calculated and compared the price paid by microgrid customers with what people pay for kerosene and candles and found that the costs of paying for microgrid electricity are far less.²²³ Deployment of microgrids that use local energy resources also improves health outcomes, since communities do not have to depend on imported diesel or kerosene.²²⁴ There is no calculated mitigation potential for microgrids, given that the electricity or thermal energy sources can vary. However, recent studies claim that microgrids with renewable generation sources can significantly reduce carbon emissions, depending on their design and energy source.²²⁵ Microgrid use is expanding and becoming more viable as integration issues are addressed.^{226,227} The energy source powering microgrids is important given that some sources, such as natural gas, can increase emissions and so, as with anything, the implementation and operation of microgrids must take into account sustainable use of resources alongside planetary boundaries, self-determination, and equity.²²⁸

Micro hydropower in Malaysia



In 2018 the people of Long Liam village in Malaysia (50 families, all Indigenous Kayan people) who opposed the Baram dam decided to build a micro hydropower (MHP) renewable energy system. They volunteered their labor and gathered materials to support the process and build the MHP with the assistance of civil society organizations such as SAVE Rivers,

Tonibung, the Bruno Manser Fund, Green Empowerment, and Seacology.²²⁹ Families have stewarded and protected their forests and maintained their energy source. In January 2019, the completed MHP installation solidified the creation of a rural electrification system that is sustainable, affordable, and environmentally safe. With the MHP, the village no longer depends on diesel generators, meaning there is no need for diesel fuel. The water catchment has been maintained for generations by the village since it is part of their ancestral forest. The villagers have highlighted the threat of logging in the water catchment area, given siltation risks and implications for the long-term sustainability of the MHP.²³⁰ The rationale for the continued protection of land and water from extractive industries has been reinvigorated within the rural community in order to preserve energy sovereignty by shifting from extractive to regenerative models, without destructive development (e.g., large dams).

Threats to success

Organizers and movements **trying to advance food sovereignty and territory rights and to protect people and the planet from resource extraction frequently confront danger, intimidation, and violence.** Common risks include criminalization, physical violence, sexual abuse, intimidation, reprisals, and even murder.²³¹ The year 2020 was a new record for murdered environmental defenders.²³² There were violent resource conflicts, and based on reported data, more than 200 activists were killed while protecting water and land.²³³ Of those recorded officially, most of the murders occurred in Latin America, with Colombia—the fifth-largest coal exporter in the world—being the most dangerous country.²³⁴ It is important to note that the number of murdered defenders is undoubtedly higher than what is reported. The danger and violence impact individual activists as well as their families, communities, and broader movements. The violence can also accompany lengthy, tedious, and intimidating legal action.²³⁵

Indigenous Peoples, trans and cis women, youth, and gender-diverse individuals face the most risk. Their opposition to extractivism is often connected to broader efforts to advance human rights and gender justice. Indigenous trans and cis women and children residing in communities close to extraction sites are at significant risk of physical and sexual assault. Camps where people employed by extractive corporations live and work are hotspots for sexual and gender-based violence.²³⁶ Powerful entities, including private companies and governments, often contribute to or enable danger and violence, since they benefit from extraction. Publicizing the threats to environmental defenders has had dual outcomes; some have benefited from increased protection due to more publicity, while others have faced increased danger from publicity. Thus, the protection of environmental defenders is a matter that needs to be addressed contextually, with collective protection mechanisms developed by the movements themselves and supported from the local to the international levels.

In some instances, local livelihoods and economies have become deeply reliant on extractive industries. There is a high degree of dependence on resource extraction and the associated revenue in countries across the Global South.²³⁷ Colonial legacies of extraction and current trade incentives have indebted countries to the point that extraction is a means of survival, at least in the near term. With national and international support, extractive industries are greenwashing their practices. Greenwashing sets a foundation for the vilification of local resistance, which is framed as resisting progress. Those controlling political and economic agendas (e.g., governments and multinational companies) deliberately manipulate narratives of extractivism to perpetuate the falsehood of development and opportunity. These corporate- and elite-backed narratives aim to create divisions and conflict within communities.

The successful proliferation of community-governed renewable energy requires expensive infrastructure, putting grassroots movements at an immediate disadvantage given the little resourcing they receive. Capital is a primary barrier for community-led and community-held renewable energy projects, as sizable up-front investments are required.²³⁸ Initial investments are needed to cover associated costs with purchasing technology and infrastructure, legal guidance, and regulatory compliance.²³⁹ Moreover, government subsidies for fossil fuel energy make it harder for community-controlled renewables to be financially viable. Legal and regulatory requirements that accompany community-scale renewable generation require access to specialized knowledge. Another barrier to community renewables is utility companies. The threat of competition has encouraged them to leverage their financial and political capital to make it more challenging to implement community-held and community-run renewable energy projects and infrastructure.²⁴⁰ Proliferating community governance of renewables will require social, technological, and economic responses that allow people to break relationships of dependence on energy systems controlled by transnational corporate monopolies.²⁴¹



Thousand Currents staff accompanied partners for an inspiring learning exchange in Nepal. Image courtesy Thousand Currents.

Case Study #1:

Village that runs entirely without fossil fuels serves as a model for microgrid community renewable energy systems

Community reconstruction in a remote village in Nepal forged a new energy generation and management vision.

Dhapsung Village, a remote, isolated village in Nepal with low income and literacy rates, was usually not accessible by road during the monsoon season. The 2015 earthquake completely devastated homes and destroyed the only energy generation system that the village used.²⁴² The goal for Digo Bikas Institute (DBI), a Nepali youth-led research and advocacy organization committed to promoting ecological sustainability and social equity, was to partner with residents and create a model village that ran entirely without fossil fuels, providing reliable and accessible renewable energy.²⁴³ This approach to community development promoted the principles of a decentralized energy system, which put the village community members in the lead of the energy project.²⁴⁴ The community was involved in the energy system's design, installation, and decision-making processes.

In partnership with the local community, DBI created a first-of-its-kind microgrid energy system, which improved gender equity and facilitated a transition to 100 percent renewable energy. DBI, with the support of Grid Alternatives and Gham Power, installed a 16 KW community solar microgrid. More than 200 people benefited from the independent, affordable, and reliable energy system.²⁴⁵ The women-led community solar microgrid user group holds the energy project's ownership, operation, and maintenance.²⁴⁶ The women's group sets the electricity tariff rates, revises the tariffs based on user

consensus, and creates different rates for household consumption and localized economic activities. Unlike the energy system they had before, the solar microgrid allows community members to use energy for more than lighting, including economic activities such as running an electric grinding mill for cereal and pulses.²⁴⁷ The 16 KW energy supplied at any given time is not always utilized. Therefore, there is an increased desire for proper guidance and training on additional sustainable economic activities. For example, villagers plan to use excess electricity to pump water for irrigation during the dry seasons and to power an electric roaster instead of the usual wood fireplace, minimizing emissions and pollution. There also is interest in using electricity to power food processing and packaging machines and to build wooden furniture to sell.

Creating the community-governed microgrid resulted in broader socio-economic changes for the village.

Residents' respiratory health has improved since LED bulbs powered by solar energy replaced the community's kerosene and pine wax light sources that emitted smoke resin and soot in unventilated homes. Children's academic performance has also improved; reliable electricity has enabled children to keep learning even after sunset. Further, the village has witnessed a surge in new socio-economic activities. For example, families built wooden furniture using an electric saw, and village homes now have light in the evenings, allowing them additional time to process their harvested crops. The microgrid's income is pooled and made available to villagers through a micro-lending program.²⁴⁸ The loans have helped families engage in small businesses that provide additional income. Community building and interconnectedness have improved from increased social events and gatherings. Lastly, the village now has access to news and information from outside the community via free Wi-Fi near the solar

grid. Since energy alone does not sustain communities, DBI also assisted residents through fundraising for the community school and supported health camps for the children and literacy programs for adults.²⁴⁹ The approach consisted of intentional and long-term engagement with the residents. One of the visions for the work was to create a community development plan that included training in sustainable agriculture since most of the food in the community was imported. DBI and the community also plan to develop a sewing cooperative led by women. The adoption of the community-owned energy model has been a key aspect of the holistic development and well-being of the village.

The impact of the solar microgrid extends outside of the Dhapsung village, making similar effects viable elsewhere. Many rural villages in Nepal lack access to the grid or off-grid electricity. DBI staff have been involved in national-level policy discussions to decrease fuel usage over time. DBI has produced reading materials, climate financing monitoring, and research studies to amplify

climate justice analysis of energy policies in Nepal. For example, the group has conducted capacity-building sessions on climate justice for members of parliament and local government officials. In addition, it has published papers on, among other topics, CSA, the future of agroecology, and the environmental damage in Province 1 (an area that includes Mount Everest). Additionally, it consults with many activists and has convened regional meetings of young people in the climate change movement. DBI tracks the enforcement and progress of environmental regulation in Nepal and advocates for conservation and sustainability at the international level.²⁵⁰ Its Clean Energy Future Initiative seeks to power rural Nepal with mini solar grids, ensuring reliable electricity in hundreds of villages and providing critical infrastructure during disasters. When aggregated with the many other grassroots solar projects happening across the world, these projects lead to a cumulative impact that is sustainable, just, and locally led.



Images courtesy Digo Bikas Institute.

Case Study #2:

How a small women-led Indigenous group against extraction has grown in impact and political power in Bolivia

Confederación Nacional de Mujeres Indígenas de Bolivia (CNAMIB), a once-small group of women, is now a broad-reaching network of women's organizations. Initially, CNAMIB addressed environmental pollution, forced displacement of communities, cultural loss, and incursions into Indigenous territories from mining and oil concessions in the lowlands of Bolivia.²⁵¹ CNAMIB became

an established organization where Indigenous women from 34 Indigenous nations gathered, developed political positions from shared grievances, and created political power through collective action.^{252,253} Since the group formed in 2007, members have created training materials on national and international laws related to Indigenous rights, organized Indigenous women leaders affected by extractive industries to share knowledge, and trained women on advocacy and political participation.²⁵⁴ These efforts have led to the leadership of Indigenous women in areas of Bolivia where it was most lacking. CNAMIB has increased awareness of the impacts of extractive industries and infrastructure projects and elevated strategies for advancing Indigenous communities' rights.

Community workshops and knowledge exchanges have been highly successful, and the work is shifting patriarchal practices that have historically restricted the participation of women in decision-making.²⁵⁵ These changes are a powerful testament to the success and respect the organization has gained.

CNAMIB's strength lies in its network, infrastructure, and social fabric. The organization has developed permanent processes to disseminate information on laws, participate in organizing events, and meet communities in territories across Bolivia.²⁵⁶ The intentionality behind these structures has enabled membership to grow while maintaining a solid organization and network. CNAMIB continues to be an influential movement for collective rights for women, both Indigenous and urban even though it was originally opposed, including by male-dominated Indigenous groups.²⁵⁷ The 2009 Bolivian Political Constitution was the first time the government recognized Indigenous rights, values, and worldviews.²⁵⁸ CNAMIB has played a critical role in incorporating the unique experiences of women in these processes.²⁵⁹



TIPNIS march, La Paz, 2011. Image courtesy Szymon Kochański, Flickr

Extractivism in Bolivia has led to intense conflict over the rights of Indigenous peasant peoples. CNAMIB was part of the Indigenous March for the Defense of the Isiboro-Sécure Indigenous Territory and National Park (TIPNIS) in 2011, which resulted in the Bolivian President Evo Morales pushing a bill through the legislature canceling a project to build a 177 km road across the national park and meeting 15 other demands presented by the protesters.²⁶⁰ Indigenous communities opposed these developments because they cut through the heart of Indigenous territories and could encourage illegal settlement and deforestation.²⁶¹ Indigenous marchers were met halfway by riot police batons and tear gas, all while being televised.²⁶² The police and government actions against Indigenous marchers provoked a national outcry, which led to larger demonstrations supporting Indigenous rights and environmental protection. These marches were fundamental for questioning the development model in Bolivia, which was based on the extraction of natural resources at the expense of nature and Indigenous peoples.²⁶³ CNAMIB is expanding its network to new areas and issues and uniting even more women leaders and activists.

“The 8th and 9th indigenous marches demanded respect for life, for land, and for decisions made by the indigenous peoples of the TIPNIS so that the road that crosses the protected area is not built. The struggle cost us dearly: many of our leaders were persecuted by the government, our education and health are neglected by the state, but beyond that, we will continue to resist with dignity.”

— Wilma Mendoza, president of CNAMIB



**From Stories
of Change to
Global Impact**

From Stories of Change to Global Impact:

What philanthropy can do to advance the systemic, strategic, and effective impact of grassroots climate solutions

Grassroots movements have demonstrated their critical role in creating and implementing durable and transformative climate solutions, but historical inequity of funding restricts their potential.²⁶⁴ Grassroots climate solutions across food and energy production are receiving more support, but it is far from the pace and scale that could be absorbed and often reflects minor adjustments to grantmaking portfolios. The philanthropic funding model must fundamentally shift and adapt to meet the global needs and potential of grassroots movements. The evidence is clear: we need a colossal level of investment in grassroots movements to ensure a livable planet. There is

an opportunity to transition to more reliable and democratic food and energy systems, and philanthropy can play a pivotal role by funding grassroots movements globally and at a scale that reflects their potential to succeed.

The right climate solutions already exist. Grassroots climate solutions think beyond emissions and scale by considering families, communities, and the rights of all people to a clean and healthy world. If adequately funded, grassroots climate strategies can more quickly contribute to national and international emissions reduction targets while improving the livelihoods and well-being of those most affected by climate change. To minimize the harm and reduce emissions from the highest-emitting sectors (i.e., food and energy), philanthropy must direct more funding to grassroots movements proportionate to their impact, needs, and capacity. Grassroots food and energy solutions have the potential to reduce thousands of gigatons of CO₂ by 2050 if they are properly funded and supported (see Table 7 below).

Table 7. Grassroots climate solutions in food and energy production

Strategy	Emissions reduction mechanism	Carbon pool range ¹⁰	Roughly equivalent to
Agroecology 	Promoting soil health and natural fertilizers, integrating agroforestry-livestock models, localizing food economies, etc.	490 GT CO ₂ e ²⁶⁵	Emissions from China between now and 2050
Preventing harm from resource extraction 	Keeping fossil fuels in the ground; eliminating emissions from resource extraction	1,300 GT CO ₂ e ²⁶⁶	Standing stock of all global forests
Community access and governance of renewable energy 	Reaching 100 percent global renewable energy; decentralizing energy systems	196.8 to 420.6 GT CO ₂ e ²⁶⁷	6 to 13 years of global energy emissions

¹⁰ Ranges are presented under a 2050 scenario.



Image courtesy Grassroots International.

Investing in grassroots climate solutions is strategic.

Grassroots innovations emerge from meticulous, scientific, and local approaches to transformative impact. People-powered grassroots movements drive social and ecological change by building an expansive popular base necessary for transformative climate strategies and policy reforms. They are sources of expertise, inspiration, and vision for their communities. They possess an intimate awareness of community needs and are the most effective in driving change since they have the greatest stake in the climate crisis.²⁶⁸ History shows that grassroots groups hold immense influence; their unwavering commitment to change means they are the ones least satisfied by small victories. The most recent IPCC report clearly articulates the need for grassroots solutions as the window for climate action narrows.²⁶⁹ Evidence shows that focusing on equity and justice, and drawing on Indigenous and local knowledge, is essential to address the climate crisis.²⁷⁰

Who should be funded? An alignment process between funders and frontline organizing groups called the Regenerative Economies Organizing Collaborative has identified four main pathways to moving large amounts of capital to support grassroots movements led by Black, Afro-descendent, women, gender-diverse, and Indigenous Peoples. We have outlined them here. All four of these pathways need unrestricted, multi-year, general operating support:^{271,272}

1) Grassroots organizations: Grassroots organizations are of, by, for, and directly accountable to the most impacted communities. Funding the grassroots directly is always preferred.

2) Grassroots-led alliances and networks: Alliances and networks created by grassroots organizations build in resource-sharing and accountability processes for collective impact.

3) Community-controlled capital infrastructure:

Non-extractive community financing mechanisms, community land trusts, and worker-owner cooperatives are examples of community-controlled infrastructure that supports grassroots governance of capital and redistribution of wealth at the community level.

4) Grassroots-accountable public and community foundations:

Public and community foundations, based both in the Global South and North, with an integrated justice and equity lens that center grassroots communities are a critical part of the current movement funding infrastructure. They not only fund grassroots organizations with flexible core support but are also directly accountable in different forms to the frontlines and also engage grassroots leaders in their decision-making processes.

What and how should philanthropy fund? Current support for grassroots groups fighting climate change is insufficient. Historically, there have been massive funding disparities in philanthropic support for grassroots movements compared to funding for large, well-resourced international nongovernmental organizations and their national subsidiaries. Though climate mitigation has become a growing priority, philanthropy is still moving most of its capital to environmental organizations based in the Global North. To date, philanthropy has funded siloed mitigation approaches that have failed to address the underlying causes of the climate crisis (see: [False Solutions](#)). For example, the Bezos Earth Fund's initial \$791 million commitment to address climate change remains one of the largest philanthropic investments. However, just five organizations—the World Wildlife Fund, the Nature Conservancy, Environmental Defense Fund, Natural Resources Defense Council, and World Resources Institute—received close to 65 percent of the Bezos Earth Fund grants.²⁷³ Generally, most philanthropic climate change mitigation funding stays in the Global North, promoting top-down approaches, with only 3.75 percent of funding going toward justice- and equity-oriented efforts.²⁷⁴ Too few of these dollars go to high-impact, cost-effective grassroots organizing in communities most impacted by climate change. Philanthropy must resource grassroots climate solutions so they accelerate impact and achieve scale.

Thus, although philanthropy is beginning to disburse tremendous resources to address climate change, unfortunately, and by design, it continues to follow a legacy of wealth consolidation that undermines progress toward collective, effective, translocal, and global climate action. The wealth consolidation that makes philanthropy possible did not spontaneously appear but rather is connected to the legacies of the four root causes outlined in this report (capitalism, colonialism, white supremacy, and heteropatriarchy). Philanthropy can:

- 1) Provide long-term, unrestricted, and substantial funding** to grassroots groups advancing climate solutions that confront extractivism, colonialism, white supremacy, and heteropatriarchy.
- 2) Stop funding false solutions** that reinforce these root causes and create harm.
- 3) Offer emergency, short-term funding opportunities**—in addition to long-term support—to frontline communities during times that require immediate action, such as extreme weather events and specific campaigns.
- 4) Revise grantmaking practices**—including how priorities are set and evaluated—and reform philanthropy so it exists to support grassroots groups. This includes giving core and multi-year funding and organizing philanthropic peers to fund grassroots movements directly in ways that enable their work and that do not generate bureaucratic barriers.
- 5) Move climate funding to grassroots movements globally** and address the vast inequity in geographical funding opportunities.

What will additional funding do? The solutions presented throughout this report demonstrate the success and potential of grassroots climate solutions. As more funding moves to grassroots groups, they can grow these efforts to improve the well-being and livelihoods of more people. Additional philanthropic funding can make the practice of agroecology and community-level renewable energy scalable and economically viable. Below are some illustrative examples of what could be accomplished if more funding and support were directed toward grassroots climate solutions.

- **Food.** Philanthropy can contribute by supporting local initiatives and their existing regional collaborations. Agroecology schools that aim to spread learning through popular education are one example out of many. For example, La Via Campesina has played a major role in cultivating more than 70 schools and training processes worldwide to promote and build knowledge and practice of agroecological peasant agriculture.²⁷⁵ Another example is the Movimento dos Trabalhadores Rurais Sem Terra (MST), a social movement that seeks land tenure and sovereignty for the Brazilian peasant population through a people's agrarian reform model. Over the past three decades, MST members have developed an alternative model for rural schooling, which seeks to incorporate practical work experience into public schools and connect schooling with broader political struggles throughout Latin America.²⁷⁶ MST's Florestan Fernandes National School, located on the outskirts of São Paulo's metropolitan region, is a vital center of learning around agroecological theory and practice within Brazil, regionally, and internationally. Funding schools like this is a small example of the immense ecosystem of agroecological strategies that funders can support, from multi-actor coalitions like the Agroecology Coalition to capacitated local municipalities and districts for coordination.
- **Energy.** Philanthropy can move beyond exploratory-sized grants and fund community-governed renewables at the magnitude that is needed for them to scale globally. Community-controlled and -held renewables are "small" because they are funded with small grants. The community-controlled energy sector continues to be chronically underfunded; what we need is large-scale capital investment to support communities to get these projects off the ground. The International Energy Agency estimates that half of the global investments in electrification in the upcoming decades will focus on microgrid expansion.²⁷⁷ The challenge will be to ensure that new systems do not perpetuate the fossil fuel model. Grassroots groups and movements have plans and ideas that could absorb the projected influx of funding and deliver effective and equitable energy solutions. The future of democratized, renewable energy depends on how well we fund and support the infrastructure of grassroots movements already doing this work.

What support can philanthropy offer beyond funding?

First, philanthropy must recognize its positionality not as an objective, outside actor, but very much part of a system that has created and benefited from inequity. Philanthropy must acknowledge the inherent conflicts of interest that are present in the sector and actively work to dismantle the harmful practices it perpetuates. Funders can further support grassroots climate solutions by:

- Committing to learning about solutions led by global grassroots movements, expanding notions of success, and moving away from the frame that funding grassroots movement solutions is risky.
- Influencing other philanthropic funders and leveraging networks and relationships to amplify movement-led solutions.
- Divesting endowments from extractive, polluting industries and investing in regenerative, community-led climate solutions (see the fourth pathway described above).
- Opening up spaces where grassroots movements can advocate and have access to wealth, policyholders, and media.



Palacode, Tamil Nadu, India. Image courtesy Deepak Kumar, Unsplash.

Conclusion

Funding grassroots climate solutions is essential for a livable planet where people thrive within the limits of nature. The underlying causes of the climate crisis—extractivism, colonialism, white supremacy, and heteropatriarchy—have solidified power differentials that enable pollution at the expense of human well-being and nature. These root causes have also influenced the system of philanthropy, its notions of success, and who it funds. Grassroots climate movements leverage frontline communities' leadership and relationships to advance solutions to the climate crisis. Grassroots movements invest in diverse efforts to transition away from extractivism and strengthen local resilience to global stressors.

The benefits of community-led climate solutions transcend mitigation; grassroots movements recognize that Indigenous sovereignty, racial justice, gender justice, and thriving local economies centered on defending life as a whole are the bedrock of a successful climate strategy. The mitigation potential of grassroots solutions in the food and energy sectors is immense. Yet the success of grassroots climate solutions works beyond mitigation. Implementing agroforestry techniques can preserve Indigenous sovereignty. Supporting community governance of distributed renewable power promotes gender equity. Using biofertilizers, rescuing locally adapted seeds, and resisting extractive industries reduces overreliance on fossil fuels, improves public health outcomes, and preserves biodiversity. Ending extraction and fossil fuel dependence enables a livable planet where all can thrive.

Grassroots solutions remain underfunded and overlooked by mainstream philanthropy, despite representing the greatest opportunity to invest in transformative climate action. Funders have an opportunity to break traditional siloes in grantmaking and implement intersectional funding approaches for reaching those with the greatest stake in climate action. Grassroots movements receive a paucity of funding, yet are poised to absorb billions in investment to accelerate their work. Funders can expand their imaginations to understand the transition possible under grassroots leadership; now is the time to listen to the frontline visions that are most commensurate with climate science and social justice.

Grassroots movements are already demonstrating their effectiveness in addressing both the root causes and impacts of climate change. The question is whether climate philanthropy will shift boldly and quickly enough. The case studies outlined in this report showcase just a handful of successful advances toward a cooler and more equitable future. Agroecology, popular movements against extraction, and decentralized, community-controlled renewable energy governance represent critical opportunities for climate funders to engage their resources and serve as partners to dynamic and resourceful movements. Funding grassroots climate movements will not only cool the planet but heal us too.

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