



**GLOBAL
FOOD POLICY
REPORT**

2022

CLIMATE CHANGE & FOOD SYSTEMS

MAY 2022



Climate change is a growing threat to our food systems, with grim implications for food and nutrition security, livelihoods, and overall well-being, especially for poor and vulnerable people around the world. The imperative for urgent action on climate change – both to achieve the major emissions reductions needed to limit global warming and to increase adaptive capacity and resilience – is drawing global attention. The *2022 Global Food Policy Report* sets out a broad range of opportunities for accelerated action that should be considered in policy and investment decision-making for climate change adaptation, mitigation, and resilience.

The impacts of global warming are becoming increasingly evident. Higher temperatures, changing precipitation patterns, sea level rise, and growing frequency and intensity of extreme weather events such as droughts, floods, extreme heat, and cyclones are already reducing agricultural productivity and disrupting food supply chains. Beyond its direct impacts on production, climate change will create cascading effects on livelihoods, communities, and sustainability through interconnections among economic, environmental, social, and political spheres. At the same time, food systems are estimated to contribute more than a third of global greenhouse gas (GHG) emissions responsible for climate change, placing food production at the center of attention as both a contributor to global warming and a critical sector for mounting an adaptive response to climate change.

Even in the absence of climate change, food systems face enormous challenges and demands. Hunger and malnutrition are rising, and over 3 billion people currently cannot afford a healthy diet. Food systems

are the world's largest "employer," but for many, particularly women, youth, and other vulnerable groups, agriculture-based livelihoods are precarious. In addition, food systems are major contributors to environmental degradation beyond GHG emissions, including deterioration of water resources and loss of habitat and biodiversity, which compromise the environmental services that support food production.

Yet global aspirations for food systems are extremely high. As was made clear in 2021 at both the UN Food Systems Summit (UNFSS) and UNFCCC COP26, food systems must play a central role in achieving multiple, pressing sustainable development and climate goals, from the local to the global level. These aspirations envision food systems that are far more nature-positive, deliver improved and more resilient livelihoods, empower disadvantaged groups, and produce a healthy mix of foods at affordable prices. Food systems are called on to accomplish all these goals in the context of a rapidly changing climate and while

making a substantial contribution to achieving net zero GHG emissions by 2050.

Action to address climate change has begun, but it urgently needs to be accelerated by hastening innovation, reforming policies, resetting market incentives, and increasing financing for sustainable food systems transformation, as well as promoting healthy diets and building resilience.

ADAPTATION IS URGENT, BUT FEASIBLE FOR FOOD SYSTEMS

The world remains far from achieving the emissions reductions needed to constrain warming to 1.5°C above pre-industrial levels. While this goal remains feasible, the longer we wait, the more difficult achieving it will become. Looking forward, scenarios from IFPRI's IMPACT model indicate that rising temperatures will negatively impact agricultural yields, driving up prices and resulting in increased hunger, especially in Africa. Unless action is taken now, this toll will add to

the many people pushed into poverty and hunger by extreme weather events, as well as by local shocks and global crises, such as COVID-19 and the current war in Ukraine, that disrupt food systems and raise food prices.

Food production, distribution, and consumption practices must be adapted to climate change to better support rural livelihoods and provide healthy diets for all, even as population and income growth increase the demand for food. At the farm level, adaptation must address changing growing conditions, water scarcity, droughts and floods, increased risks of destructive weather events, and related risks of disease and pests. Along value chains, storage and logistics will also be affected by climate change, and price volatility will increase, with implications for processors, traders, and consumers as well as farmers. Climate change will put increasing pressure on scarce natural resources, which can increase the risk of conflicts. Such conflicts can affect entire value chains and are a major driver of increases in global food insecurity and hunger. Recent experience with the COVID-19 pandemic has shown





us how disruptions in one part of a value chain can have wide-reaching impacts. But it has also shown us how food systems, including public and private sector actors, can respond and adapt quickly to severe shocks.

A number of promising innovations show potential to support adaptation and build resilience while also increasing productivity. These climate-smart innovations include new crop varieties that better withstand climate shocks and improve yields, solar energy for product storage, and digital technologies that expand access to knowledge and services for rural producers. Many climate-smart innovations, such as no-till farming, agroforestry, and landscape management, will also support mitigation by sequestering carbon or reducing emissions. However, technical innovations will never reach their full potential without the right enabling environments, including policy incentives and governance approaches that promote climate-positive change and inclusion of all food systems actors. Policies and institutions at the local, national, and international levels need to incentivize the development and adoption of new technologies and practices and ensure adequate finance is available. They must recognize potential trade-offs – in terms of yields and efficiency – between sustainable systems and existing or other modern farming practices and between

sectors, such as energy and water. Policies must also facilitate coordinated action across stakeholders and ensure equitable systemic transformation for all.

FOOD SYSTEMS PLAY A VITAL ROLE IN MITIGATION

Despite international commitments to reduce GHG emissions, total net anthropogenic GHG emissions continue to rise. Stepped-up efforts to reduce GHG emissions are required of developed economies, and progress by developing and emerging economies is also necessary, but it is important to bear in mind that the least developed countries accounted for only 3.3 percent of global GHG emissions in 2019.

Food systems are estimated to generate as much as 34 percent of total greenhouse gas (GHG) emissions, which stem from agriculture and land use, storage, transport, packaging, processing, retail, and consumption. Continued progress in energy and transport sector technologies can reduce fossil-fuel use and emissions throughout food systems, including in irrigation, processing, transport, cold storage, and waste recycling. However, two-thirds of food systems GHG emissions – or about 21 percent of total emissions from all sources – are from agriculture, forestry,



and other land use (AFOLU). AFOLU has potential to deliver substantial emissions reductions and carbon sequestration. It is the only economic sector with serious potential to become a net emissions sink – pulling more GHGs out of the atmosphere than it emits – through creation and protection of carbon sinks such as forests. Of AFOLU CO₂ emissions, almost half are from land use change and management. Net agricultural land expansion is now concentrated in the developing world, primarily in Africa and South America, while land use change in some developed countries is offsetting emissions. Some developed countries have scope for creating larger net sinks for emissions, but developing countries should prioritize fostering agricultural practices that both raise productivity and turn the tide on AFOLU emissions.

Significant GHG mitigation can also be achieved by reducing nitrous oxide emissions from fertilizers

and methane emissions from paddy rice and enteric fermentation (from cattle and other ruminant digestion) as well as decreasing emissions intensity through sustainable production systems and reduced food loss and waste. Shifting food consumption toward healthy diets has also been found to have substantial potential for emissions reduction. Combined, these efforts could move the world toward net zero emissions.

POLICY RECOMMENDATIONS

Promising policy responses for adaptation, mitigation, and resilience to climate change are explored in the *2022 Global Food Policy Report*. Here we review broad findings and recommendations from the report that can support climate change responses in the short term and build resilience and capacity for the future.

R&D for climate-resilient, resource-efficient, and sustainable innovations in food systems

A portfolio of current technology innovations could accelerate sustainable food systems transformation. Many of these innovations have proven potential to both raise productivity and reduce GHG emissions intensity in agrifood production. Irrigation technologies, such as drip irrigation and solar power pumps, can both improve yields and reduce emissions. New genome-editing technologies, such as CRISPR, have proven capable of rapidly developing crop varieties suited for climate change adaptation and mitigation. Improved cold chain technologies powered by solar energy and new drying methods are increasing food quality and availability and reducing food waste, particularly for perishable nutritious foods. Digital innovations are revolutionizing production, markets, and delivery throughout food systems, with great potential for improving productivity and quality and reducing natural resource use and food loss and waste. This broad array of innovations in data use stretches from precision agriculture and improved weather forecasting to blockchain-based product quality and sustainability traceability and to e-logistics and e-commerce for enhanced value chain efficiency.

Development and adoption of such “disruptive” innovations requires investment in R&D. A review

of evidence on the benefits of past investments in R&D for innovation in agrifood systems finds that the benefit-cost ratio of such investments can be at least 10 to 1, contributing much more to reducing poverty and hunger than other development investments. In addition, investment in development and adaptation of “green” innovations for use in low- and middle-income countries (LMICs) could help reduce AFOLU emissions by some 40 to 50 percent. Despite these substantial benefits, food systems R&D is notably underfunded, especially in LMICs, with only a small share for adaptation and mitigation. Based on this evidence, the report recommends:

- Public investments in R&D for productivity-increasing and emissions-reducing innovations should be doubled from current levels, with at least US\$15 billion of the increase for innovations benefiting food systems in LMICs.
- R&D investment should focus on innovations for sustainable intensification in LMICs, both on and beyond the farm.
- Global and regional mechanisms for knowledge sharing, such as the CGIAR system, should be enhanced and strengthened to facilitate technology diffusion that benefits countries with limited domestic research capacity.



- Governments should create stronger enabling environments to attract private sector investment for agrifood innovations and to spur adoption of improved technologies and practices, including resetting distortionary market incentives created by agricultural support and trade regulations and improving regulation for safe adoption and market acceptance of new technologies.

Holistic, inclusive governance and management of water, land, forests, and energy resources

Improved efficiency of natural resource use will be essential to increasing productivity while reducing environmental degradation and GHG emissions. The close links among water, energy, land use, and food systems demand integrated policy responses to climate change and effective institutions to prevent undesirable trade-offs among development goals. Use of modern energy technologies, for example, is essential for raising productivity – including for pumping of

irrigation water and storage, transport, and processing of food products – but fossil-fuel use contributes to GHG emissions. Expanding access to clean energy sources, such as solar power, in the agrifood sector is therefore critical, but brings its own risks of increased exploitation of water and other farm inputs.

Governance through integrated landscape approaches has potential to achieve sustainable use of land, water, forest, and energy resources, including long-term productivity and greater sequestration of CO₂. However, integrated landscape management is complex; it requires effective stakeholder engagement, inclusive governance, adequate coordination





between local, regional, and cross-border natural resource management, and compromises among diverging economic and political interests. To promote holistic, inclusive, and integrated landscape approaches for sustainability, the report recommends that:

- Agricultural, food, and climate change policies should explicitly consider landscape dimensions and provide incentives for integrated landscape management through local governance, including development of multistakeholder platforms that can build support and capacity for collective action.
 - Land tenure and access rights to other natural resources for farmers, rural households, and communities should be strengthened to motivate investments in sustainability and participation in landscape governance.
 - Governments should promote adoption of clean energy sources in agrifood systems through an enabling environment and appropriate financial incentives for the use of wind and solar power and decentralized electricity grids.
- Identification of productive-use locations that could jointly support energy, water, and food security can attract investments that increase productivity and sustainability.

Promoting healthy diets and increased sustainability of food production

Globally, undernourishment and micronutrient deficiency continue to rise even as overweight and obesity are becoming more prevalent. These forms of malnutrition now affect about a quarter of the world's population, and poor diets are among the largest global health risks. Making healthy diets affordable and influencing consumers to make healthier choices is key to overcoming these global nutrition challenges and can be well aligned with addressing climate change. The ecological footprint of healthy diets – without excessive consumption of highly processed foods and red meats – has been found to be much lower than that of prevailing diets across the world, but especially those in advanced countries. Key policy directions to change dietary habits include the following:

- All countries should adopt national food-based dietary guidelines. These can be a key policy instrument to translate global evidence on healthy and sustainable diets into practical, culturally appropriate, and context- and population-specific dietary recommendations.
- Innovation policies should prioritize R&D for nutrient-rich foods (including fruits and vegetables) to make healthy diets more affordable. Targeted consumer subsidies and removal of taxes on healthy foods will also help to lower the costs of healthy diets for low-income households.
- Consumers can be encouraged to make healthy, sustainable food choices through educational campaigns and changes in food environments, including use of food standards, labeling, and certifications that warn of unhealthy foods and signal the nutritional value and environmental footprint of foods.

Improving value chain efficiency, facilitating trade, and reducing food loss

Climate change impacts – including shifts in crop production, rising temperatures, changing humidity

levels, and more frequent extreme weather – will affect whole value chains through which agricultural products are traded, aggregated, processed, and sold to consumers. Incentives for producers and other value chain actors will be altered as climate change reduces the effectiveness of some inputs, increases risks, and impacts transaction costs. International trade that takes equitable account of GHG emissions can play a key role in softening these impacts by reducing price volatility and providing access to food for countries that have suffered a drop in production. Both trade and investments in climate-smart practices all along value chains can support adaptation through increased efficiency of resource use and reductions in food loss.





Climate-smart practices in value chains can also reduce the large share of agrifood sector GHG emissions generated beyond the farmgate, largely by energy use and food loss and waste. Policy priorities include:

- Free and open trade should be an integral part of climate-smart agricultural and food policies. Trade allows countries to obtain nutritious foods at the lowest cost and can be a key tool for adaptation in the face of weather-related production variability. Globally, trade, in conjunction with efforts to reduce transport-related GHGs, can promote more efficient use of natural resources and help reduce GHG emissions from agrifood production.
- Investments along value chains for efficient and safe storage and transport of food crops and products, including low-emissions cold chains for perishable products and other measures to prevent spoilage and safety hazards, can improve access to healthy diets and reduce food loss and waste.
- Increasing consumer demand for sustainably produced foods, for example through certification programs, can create incentives for changing practices along entire value chains.

Inclusion and social protection

Poor rural populations who depend on agrifood systems for food and livelihoods are among the most vulnerable to the impacts of climate change. These groups remain underserved in many ways, including access to markets, finance, and knowledge, as well as energy and natural resources, and hence have limited capacity to benefit from innovations in food systems. Policy reforms must both improve access to services, markets, and financial tools, particularly for women and other vulnerable groups, and ensure a secure safety net for all vulnerable populations. Social protection systems now cover about 2 billion people around the world, and while their potentially important role in addressing climate change challenges has been recognized for more than a decade, they now need to be expanded to do so more effectively. Increased resilience, empowerment, and agency among the disadvantaged can support multiple social, economic, and environmental benefits.

- Climate-positive food systems transformation will require development of context-appropriate institutions and “soft” infrastructure inclusive of rural and urban food system actors, including equal access to digital climate services, innovative insurance tools,



advisory services, and financial services to support increased productivity and sustainability.

- Women’s participation, along with that of other vulnerable groups, should be strengthened across all resource governance, including in clean energy systems, water systems, landscapes, crop development, and digital innovations.
- Social protection programs can provide a safety net for vulnerable groups and support sustainable food systems transformation, including the transition to more climate-resilient crops and to off-farm and urban employment.
- Expanding “adaptive” social protection programs that comprise traditional social assistance, humanitarian responses, and disaster relief, and that are integrated with complementary climate investments targeted to the poor, can immediately reduce the impact of shocks and support inclusion in food systems transformation.
- Improved real-time monitoring of food crisis risks is needed to take early and preventative action to protect vulnerable populations in contexts affected by conflict, natural resource scarcity, and exposure to climate shocks.

Reorienting financial flows and attracting new finance

The future of food systems depends on access to sufficient funding to facilitate a shift to sustainable production and consumption and to better livelihoods. Current financial flows – including agricultural support, international development funds, and private investment – are at best insufficient and at worst counterproductive to climate-resilient development. They often support unsustainable and unhealthy production while undervaluing environmental impacts. As much as \$350 billion per year will be needed to meet climate-related goals in food systems, much of which could be “reoriented” from existing sources. Moving forward, investment for environmental, social, economic, and nutrition goals could be increased in several ways:

- Reform of counterproductive incentives created by current agricultural, trade, and investment policies can mobilize both public and private finance for climate-positive food system transformations and reorient funds toward climate finance.
- Public support to agriculture, totaling an estimated \$620 billion, should be repurposed toward R&D for green innovations and to incentives to producers to adopt climate-smart technologies and practices.

Such innovations should focus on increasing productivity, reducing emissions, and enhancing resilience in food production.

- International development funds should be clearly targeted to meeting climate and sustainability goals, and used to leverage or crowd-in private funds from global capital markets.
- Reorientation of consumer demand, through better information, food environments, and fiscal tools, will also create incentives for producers to adopt and invest in sustainable and climate-resilient practices.
- Innovative mechanisms for tapping additional resources, such as publicly guaranteed “green

bonds” or climate-impact transparency requirements for banks and investors, should be explored to ensure climate finance needs will be met.

Achieving these reforms and ensuring widespread adoption of innovations will be politically challenging. Policy solutions, including incentives, institutions, and financing, will need to be tailored to a wide range of contexts and to balance environmental, nutritional, economic, and social goals. Regions, countries, and local landscapes will need to establish their own priorities, address potential trade-offs, build constituencies for reform, and ensure that reforms generate widespread benefits.

Investing in policies and innovations to support sustainable food systems will contribute significantly to global economic prosperity, poverty reduction, food security, and healthy diets as well as to planetary health. Achieving the ambitious goals set for food systems will require inclusive, holistic approaches that consider all components of our food systems, from local to global and from farmer to consumer. Charting optimal pathways for sustainable food systems transformation will be challenging, but we must step up our efforts now to ensure our global future.



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