FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Climate-Smart Agriculture and Food Systems

U.S. Government's Global Food Security Strategy Activity Design Guidance

This is one of several Activity Design Guidance documents for implementing the U.S. Government's Global Food Security Strategy. The full set of documents is at www.feedthefuture.gov and www.agrilinks.org.

Introduction

This document provides guidance for achieving climate change adaptation and mitigation outcomes in Feed the Future activity designs. Since climate change affects all our programming, this guidance relates to achieving outcomes under all the U.S. Government's Global Food Security Strategy (GFSS) objectives and intermediate results, while also safeguarding productivity gains and livelihoods in light of a changing climate and achieving emissions reduction cobenefits.

The Challenge

The world's food and agriculture systems are increasingly vulnerable to intensifying climate change impacts. Increased rainfall variability, more frequent and extreme weather events, changing seasonal patterns, rising temperatures, rising sea levels, changes in water quality, spread of pests and diseases, and pollinator declines, among others, are already harming production systems and human well-being. Models predict a decline in global yields of major crops due to climate change, including a reduction in maize yields by 24 percent by the end of the century, absent adaptive research and other measures, with changes in yield signal already present in some regions.[1] Moreover, areas where the U.S. Agency for International Development (USAID) focuses on food security programming have generally contributed little in the way of emissions, yet these same agriculture and food systems are suffering disproportionately from the impacts of climate change.

Agriculture and food systems are responsible for roughly a third of greenhouse gas (GHG) emissions,[2] primarily driven by land use change, deforestation and degradation, livestock, fertilizer use, wet rice cultivation, food that is lost or wasted, and energy use for transport, processing, and marketing. Globally, agriculture must reduce emissions by 1 gigatonne of carbon dioxide equivalents per year by 2030 to achieve the 2°C limit set by the Paris Agreement, a significant challenge given increasing demand for food from the world's growing population.[3]

The poorest 52 countries in the world, including the countries where USAID focuses its agricultural investments, contribute less than 1 percent of overall GHG emissions, of which roughly less than half are linked to agricultural production.[4] As economies grow, there are opportunities to take advantage of low emissions pathways to support agricultural sectors in developing countries to advance in a more sustainable way. For example, the short-lived, rapidly degrading nature of atmospheric methane presents an opportunity for "rapid mitigation" that can slow the rate of global warming if the rate of methane emissions can be reduced below business-as-usual levels. Business-as-usual refers to the baseline case with no actions taken to reduce emissions.

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What Are Climate-Smart Agriculture and Food Systems?
An integrative approach that helps guide actions to transform the agriculture and food systems and explicitly aims for three objectives: (1) sustainably increasing agricultural productivity to support equitable increases in farm incomes, food security, and development; (2) adapting and building resilience of agricultural and food systems to climate change at multiple levels; and (3) mitigating climate change by increasing carbon sequestration or reducing GHG emissions associated with agriculture (including crops, livestock, fisheries, and aquaculture), either in absolute terms or by reducing emissions intensity in the context of low emission development.

Broadening this approach to the agriculture and food systems means expanding the lens past producers to examine these three objectives throughout the functions, capacities, and inputs of the agriculture and food systems. This includes the people, behavior, relationships, and resources involved in the production, storage, processing, and distribution of crops (e.g., food, feed, and fiber), livestock, forestry (e.g., timber and nontimber), and wild-caught fisheries and aquaculture.

Climate impacts across agriculture and food systems are diverse, including, but not limited to, heat and drought stress for crops and livestock; heat stress and health risks for producers and workers; damage to greenhouses, storage facilities, and other infrastructure; and reduction in water availability for crops, livestock, and food preparation, which impacts food security by reducing agriculture and food systems productivity, nutrition, incomes, and market access and efficiency.

Climate change impacts are felt acutely by marginalized and underrepresented groups—including the very poor, women, youth, persons with disabilities, Indigenous Peoples, and local communities—who may have limited economic options, lack social safety nets, and, in rural areas, often depend on agricultural livelihoods highly vulnerable to climate change. Important sources of food and income include rainfed agriculture, noncultivated plants, pastures, rangeland, hunting, and wild-catch fisheries. Women and girls are disproportionately impacted by climate change due to gendered livelihood roles and social and legal gender inequities that grant greater access to and control over resources to men and boys.

Connection to Climate Strategy

The USAID Climate Strategy 2022–2030 guides the Agency's approach to helping partner countries mitigate GHG emissions and build resilience to climate change, and improving USAID's operations. Just as we cannot achieve the success outlined in the GFSS without considering climate, agriculture and food security programming is critical for achieving Climate Strategy targets.

Activity design teams should review the Climate Strategy, its foundational principles, strategic objectives, intermediate results, and targets and consider what components are relevant for the activity and what targets are feasible for the activity to contribute to. The USAID Climate Strategy targets are:

- **Mitigation:** Support activities that reduce, avoid, or sequester 6 billion metric tons of carbon dioxide equivalent.
- **Natural and Managed Ecosystems:** Support the conservation, restoration, or management of 100 million hectares with a climate change mitigation benefit.
- **Adaptation:** Enable the improved climate resilience of 500 million people.
- **Finance:** Mobilize $150 billion in public and private finance for climate.
- **Country Support:** Align our development portfolios with countries' climate change mitigation and adaptation commitments in at least 80 countries by 2024 and support our partners to meet those commitments in at least 40 countries.

- **Critical Populations:** Support our partners in achieving meaningful participation and active leadership in climate action of Indigenous Peoples, local communities, women, youth, and other marginalized or underrepresented groups in at least 40 partner countries.

Terminology and Context

Adaptation: The process of adjusting to the actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities (Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) Working Group 1 (WG1)).[5] The goal of climate adaptation programming is to enhance resilience and reduce the vulnerability of people, places, systems, and livelihoods to actual or expected impacts of climate change, including through improved use of resources (such as short-cycle varieties), information, planning, and action.

Agriculture and Food System: The intact or whole unit made up of interrelated components of people, behaviors, relationships, and land, water, and other resources that interact in the production, processing, packaging, transporting, trade, marketing, consumption, and use of food, feed, fiber, and other outputs through aquaculture, farming, wild fisheries, forestry, and pastoralism. The agriculture and food system operates within and is influenced by social, political, economic, and environmental contexts.

Emissions Intensity: The level of GHG emissions per unit of economic activity, for example, the emissions related to 1 kilo of meat or grain produced.

Food Loss and Waste: Food loss is the decrease of food quantity or quality at the farm or storage stage, while food waste is food appropriate for human consumption that is discarded, which occurs at the retail and consumer level.

Mitigation: A human intervention to reduce emissions or enhance the sinks of GHGs.[6]

Mitigation or Adaptation Cobenefits: Many interventions focused on either mitigation or adaptation generate collateral benefits for the other. For example, conservation of forests and watersheds can enhance carbon sinks, while also generating more sustainable water availability that increases adaptation for farmers, herders, or fishers. Conversely, increases in soil health from increases in system biomass offer increased carbon sequestration opportunities and fertilizer use efficiency gains, generating mitigation cobenefits.

Designing Activities

Activities should incorporate the priority areas identified in the GFSS and the principles highlighted in the USAID Climate Strategy:

- **Locally Led Development:** Sustainable and equitable actions should be locally led, owned, and implemented and should be tailored to the end user and be context appropriate.
- **Equity and Inclusion:** USAID will center its actions in the context of the diverse communities in which we work and ensure that local, marginalized, and underrepresented groups—including women, youth, persons with disabilities, and Indigenous Peoples—are meaningfully engaged in and lead efforts related to climate change, and receive equitable opportunities and benefits.
- **Private Sector Engagement:** Partnering with the private sector expands the scale, impact, and sustainability of our programs.
- **Nature-Based Solutions:** These actions, which protect, manage, and restore ecosystems (and managed systems, such as agricultural land) that address societal challenges effectively and

adaptively, are key tools to absorb carbon, reduce disaster risk, support livelihoods, and improve food and water security.

- **Evidence, Technology, and Innovation:** USAID will support the rigorous research, technology, and development needed to identify and deploy effective climate solutions, including those locally known and developed.

Mainstreaming climate adaptation or mitigation for Feed the Future activities refers to systematically re-examining or identifying climate risks and appropriate adaptation and mitigation options, and integrating them in an intentional and measurable way in program design.

New Feed the Future designs should integrate climate adaptation and/or mitigation outcomes from the beginning, while reinforcing that climate-resilient agriculture and food systems are fundamental to achieving outcomes such as food security; availability of nutritious, safe, and affordable diets; and profitable livelihoods. Existing programs should also consider the ways in which climate change adaptation and mitigation outcomes can be mainstreamed.

Our main objective—to ensure smallholder farmers both drive and share in economic development and improved livelihoods and opportunities—can be achieved while also supporting local practices and innovations that achieve low emission development, many of which have adaptation and productivity cobenefits. "Low emission" can represent a range of emissions-related goals that include absolute emissions reduction, reduction in emissions intensity, and carbon sequestration—such as would be accomplished through conservation of productive resources (e.g., soil, water, and wetlands), integration of perennials or agroforestry, and rangeland or watershed management. It is anticipated that in many Feed the Future countries, absolute emissions related to the agriculture and food systems will increase. Climate-smart approaches can put economies on track for lower emission economic growth than they would have had otherwise (see text box on livestock programming). Mitigation pathways in agriculture and food systems are technically feasible and low cost, with roughly 75 percent of the cost-effective agriculture mitigation solutions applying to developing and least-developed countries.[7]

Depending on the context, USAID programming may seek to drive down absolute emissions, such as from land use change related to deforestation and degradation, or more efficient use of fertilizer and energy for irrigation in some contexts where these are overused. In other instances, and particularly in the low-income developing countries where USAID food security efforts are concentrated, emissions intensity reduction may be a more accurate measure of a mitigation goal, such as in areas where increased fertilizer use is critical to enhance productivity or where increased livestock rearing is needed to address critical nutrition deficits. Reducing emissions intensity in low-income countries can help reduce projected, business-as-usual increases while advancing nutrition and other development objectives. Additional entry points for low emission action in agriculture and food systems include mechanization and irrigation efforts, transport, and processing, particularly in renewable energy and energy efficiency, that can lower costs, enhance reliability, and increase energy access.

The following list of design considerations should be used by Feed the Future activity design teams:

1. Understand Climate Risk and Impacts. New activity designs are required to undertake USAID's Climate Risk Management (CRM) process of assessing, addressing, and adaptively managing climate risks that may impact the ability of USAID activities to achieve objectives. Missions can draw upon past analyses, including prior CRM outputs, if the findings are still valid. For USAID's purposes, climate risks have potential negative consequences for programming. The CRM process has four main phases: (1) plan for assessment; (2) conduct the assessment; (3) incorporate the results; and (4) implement and manage. This process helps with identifying risks, designing appropriate interventions, determining expected results, and documenting and monitoring progress. More information on the CRM process can be found on Climatelinks.org and in the relevant A Mandatory Reference for ADS Chapter 201. CRM, when implemented correctly and to its fullest potential, is an asset and tool for quick, easy, and low-cost initial screening to identify a meaningful scope for a further vulnerability assessment in the next phase of the program cycle. For example, understanding the risks to key value chains is critical to help ensure that crops Feed the Future will support can adapt to a warmer world, which enhances the sustainability of Feed the Future's work. During the CRM process, it is recommended that all agriculture programs consult and make use of the Agriculture Annex[8] that is designed to provide design teams with more information on climate change implications for agriculture (including terrestrial agriculture, pastoralism, fisheries, and aquaculture). Climate risk profiles for different countries summarize key climate stressors and risks most relevant to a program and a Mission's objectives.

In situations where a CRM process is complete, Feed the Future design teams are encouraged to evaluate the output and consider a deeper analysis at the design stage or to be conducted by the eventual implementer after award. Ask questions such as: Was the CRM thorough? Did it identify all the risks, accurately assess their magnitude, and propose sufficient ambition to address the issues? Do we need to promote adaptation to reduce exposure and vulnerability to risk in the short or long term? To what extent are the adaptation and mitigation strategies responsive to addressing the major climate change emissions in the country associated with land use and across agri-food systems?

Guiding Questions

Some questions that help guide climate adaptation programing across all sectors include:

- What are the key climate vulnerabilities and risks in your area of intervention?
- What are the priorities of your host government in terms of adaptation?
- What are the climate risks/vulnerabilities you will be addressing and how will these actions address the risks identified?
- Who/what are the main beneficiaries from these actions?
- What results are expected? How is the risk or vulnerability of food security and malnutrition reduced? Alternatively, how will the adaptive capacities of beneficiaries be enhanced and their resilience improved?
- What other key sectors could contribute to support adaptation actions? How can the proposed adaptation actions benefit Mission activities in other sectors?
- What are potential adverse impacts of your planned adaptation intervention and for whom, and how can those be minimized?

GHG emissions fact sheets provide information that may be useful in identifying climate change mitigation opportunities, while a user guide explains the information presented in the GHG emissions fact sheets. See the Guiding Questions text box for a list of questions to help guide adaptation program design.

A vulnerability assessment can be used to better understand and dig deeper into the climate risks of relevance and to identify proper entry points for adaptation action. For example, if increased rainfall variability is identified as a factor, the vulnerability assessment could match the cropping cycle to the periods of time when this increased rainfall variability is most pronounced, and thus offer strategies for addressing this based on the cropping stage.

2. Understand Synergies and Trade-Offs. There are a number of competing priorities to consider when designing Feed the Future activities, and designing activities to achieve climate adaptation or mitigation outcomes can seem overwhelming. Synergies—actions that can contribute to a combination of climate change adaptation, mitigation, and sustainable food security and nutrition goals—exist throughout the agriculture and food system. A prime example is in the area of resource-use efficiency, which often offers a climate, environment, and economic win. These synergies and trade-offs involve intentionally examining and weighing multiple outcomes associated with various strategies and options, including who benefits.

For example, addressing systemic inefficiencies can take advantage of synergies. Strengthening seed systems can support the delivery and use of climate-resilient seeds or supporting the provision of digitized market information can help actors locate products and meet consumer demand. Food loss and waste is one of the underlying drivers of inefficiency and GHG emissions in the agriculture and food systems. Food is lost and wasted at multiple points: in fields due to spoilage and pest damage, while being stored, in transit, and when it goes unused by consumers. Activities that increase value and help reduce food loss and waste have the potential to increase affordability and safety of nutritious diets, as well as increase incomes by preserving more production and improving market, storage, transport, and processing efficiency while also reducing GHG emissions. See also the GFSS Activity Design Guidance for Diets and Food Safety.

A Low-Emission Pathway for Livestock Activities

Agriculture methane emissions represent the largest share of anthropogenic methane emissions. The majority of agriculture emissions come from livestock enteric fermentation, and other major sources include manure and rice cultivation. Livestock sector growth in response to growing demand for animal-sourced food requires policy and programs to avoid increasing livestock sector exposure to climate risks and to reduce sector GHG emissions intensity (i.e., reduce GHG emissions per unit of agricultural output). Closing livestock yield gaps through breeding, health, feed, and market efficiencies offers a path toward climate adaptation and mitigation and sustainable sector development.[9] Improving livestock productivity through enhanced feed quality and animal health, together with improved management, is one of the most effective ways to reduce enteric fermentation methane emissions in developing countries. These activities have strong cobenefits for human health, nutrition, and development. Additional adaptation options include improved water access, shifts in the type of production systems (including diversifying livestock varieties), and increased access to livestock insurance and early warning systems. Further mitigation options include reducing emissions and increasing productivity per unit through manure management and optimization at age of slaughter strategies; limiting, and ultimately sequestering, carbon emissions from grazing and pasture lands (including avoiding deforestation); and shifting demand away from higher-emitting livestock species (e.g., cattle) toward lower-emitting species (e.g., poultry).[10]

Supporting healthy fisheries can contribute to food security, livelihoods, and resilience; help communities adapt to climate change impacts; and the healthy mangroves and seagrass beds, which are an essential part of coastal and ocean ecosystems that support fisheries, can help with carbon cycling and sequestration.

It is also important to consider trade-offs when designing activities. For example, increasing the productivity of certain commodities may improve income at the household level, but may have little impact on conserving land use; conversely, other kinds of commodities may have impacts on nutrition and diets, but less on income. Chemical fertilizers are essential for achieving productivity gains, and fertilizer production is an energy-intensive process, but research on new fertilizer production with lower emissions intensity, for example, using “green” ammonia (green refers to ammonia produced from renewable energy), can change the future of the sector. Improving soil health and input efficiency can also help to balance this trade-off through practices like increased fertilizer efficiency through localized fertilizer recommendations; conservation agriculture approaches, including legume intercropping and retaining crop residue; and use of manure.

When appropriate, design teams may consider including sustainable intensification, an approach to agriculture that seeks to simultaneously maximize systems benefits and minimize trade-offs across productivity, economic, environment, human, and social indicators. This approach includes a framework using different domains to assess the extent to which, for example, additional inputs and practices increased agricultural yields, saved labor—in particular women's labor—and minimized adverse environmental impact, including conversion of additional nonagricultural land. Activity design teams can use this framework to weigh different priorities and their linkages.

3. Use a Resilience Lens. Resilience is an approach rather than a sector, and incorporating it in activity design reinforces the GFSS high-level goals of reducing poverty, malnutrition, and hunger. Building resilience to shocks and stresses requires addressing a wide set of inherently connected challenges that together can prevent vulnerable communities from achieving well-being, prosperous livelihoods, and economic security. These challenges can include governance failures and weak institutions; recurrent climate stressors, including droughts and floods; health and economic shocks; and conflict and insecurity. The level of resilience within any system—from household to country—depends on a multitude of factors that affect whether and how risks are reduced and managed. The various components of resilient systems often interact in complex, nonlinear ways, with improvements in one area positively affecting others. Consider designs that manage risks while enhancing shock response capacity, such as through community risk management plans, climate information services, irrigation, enhanced postharvest activities, and flood control. Feed the Future programs can strengthen inclusion and last-mile delivery of climate resilience services through adaptive and shock-responsive social protection programs through several approaches, for example, through directly supporting the social protection architecture and targeting mechanisms, such as using a common social registry that reaches marginalized groups and entire populations. Where possible, Feed the Future programs can also sequence, layer, and integrate market-led food security and nutrition programming, USAID Bureau for Resilience and Food Security activities, and national adaptive social protection programs that include large agricultural and climate resilience components. Please review the GFSS Activity Design Guidance for Strengthened Resilience Among People and Systems and the GFSS Activity Design Guidance for Social Protection. Disaster risk management efforts can integrate climate-smart considerations, such as cash for work investments in land rehabilitation, and vouchers to purchase climate-adapted seeds from local distributors.

4. Promote Use Efficiency. In many areas where USAID works, there are tremendous opportunities to increase water, fuel, fertilizer, and other resource use efficiency in ways that increase climate resilience and reduce emissions intensity. Improving yields is critical but, if achieved through economically or environmentally unsustainable practices, will not lead to lasting outcomes that drive improvements in poverty, food security, and nutrition. Food security outcomes may be served by using a higher amount of inputs (e.g., climate-resilient seed, mechanization, fertilizer, and animal feeds) and being more efficient in how those inputs are used, which can both support improved food security and resilience as well as reduce emissions intensity. This can be a win-win-win, as it lowers costs per unit of production for farmers, supports increases in total production to meet demand, and encourages a low emissions path.

Technologies like solar pumps and drip or small-scale irrigation can save labor and increase yields, and enable better management of water resources as rainfall patterns change. Service provision models, such as land leveling, mechanization, harvest, drying, or storage, can save labor and increase the productivity of the producer and the agriculture and food systems.

The lens for efficiency use needs to extend beyond the producer to the wider agriculture and food system. Reducing postharvest losses and transaction costs, through storage bags or warehouse receipt systems, will increase efficiencies, and can further reduce climate change impacts. Investments in infrastructure, like roads, warehouses, energy-efficient cold chain, and market infrastructure, make it easier and more efficient for producers and market system actors to do business. Applying circular economy models can be used to capture unsafe, inedible food and recycle it back into the food system as food or feed, such as insect protein.

5. Seek Opportunities for Sustainable Agriculture and Food System Transformation. Feed the Future programming often engages local, regional, and national government partners to support the enabling environment and a thriving agriculture and food system. National policies and their implementation at local levels can be powerful tools for achieving climate-smart agriculture and food systems. Activity design teams should seek opportunities to amplify work in policy and the enabling environment, to include climate change outcomes. Transforming systems to be more resilient to climate change makes our interventions more durable and able to pivot to changing needs. Government policies can provide incentives or disincentives for the private sector and households to adopt climate-smart innovations and practices. Smart subsidies can promote use of energy-efficient farm equipment; regulations and taxes impact land use, affecting climate emissions.

Land tenure and land use policies can incentivize sustainable, intensified productivity while reducing deforestation and resource degradation. Improved water resource management and sustainable fisheries management policies can support continued productivity and conserve the resource base.

Design teams may want to consider supporting the enabling environment for payments from the voluntary carbon market for carbon credits. Communities can contribute to measurable climate benefits through controlling conversion of forests and other high-carbon ecosystems for agriculture, increasing the stock of trees on farms through agroforestry, and through increasing or maintaining carbon storage in soils. These benefits can be measured and compensated as part of carbon projects or jurisdictional-scale carbon programs. The Northern Rangelands Trust program is an example of a carbon project based on soil sequestration from improved grazing.[11]

Data, information, and analysis can support decision-makers with the evidence they need. Weather, climate, and remote-sensing information can help improve understanding of food availability and stability. Enhancing access to, and use of, climate information services, including early warning systems, can support governmental agricultural decision-making and help producers better prepare for and respond to weather and climate risks. Supporting partner governments to strengthen their reporting, monitoring, and data platforms to meet their nationally determined contributions (NDCs) and national adaptation plans (NAPs) under the Paris Agreement can also enhance climate change adaptation and mitigation outcomes across multiple sectors.

Further, advancing low emission and climate-resilient agriculture pathways will require coordination across integrated sectors, such as sustainable landscapes, global health, biodiversity, energy, governance, and other programming, based on shared outcomes or objectives related to climate. Alignment can include working in shared geographies and communities (as appropriate), supporting communication between implementing partners, and carrying out joint interventions that build on each other.

6. Understand Producer Motivations and Market Incentives. Understanding preferences and the local appropriateness of innovations will determine what aspects of climate innovations are likely to be adopted by producers and market actors. Producers make their choices based on preference, which can include considerations of time, money, labor, or productivity gains. Many are risk averse—they may seek to minimize the risk of a bad harvest rather than maximizing productivity. Preferences and motivations of stakeholder groups, including direct and indirect activity participants like public and private sector actors, producers, women, and households, will help determine what innovations, investments, and other leverage points to maximize and contribute to sustainability of interventions.

For example, conservation agriculture practices can provide both climate change adaptation and mitigation benefits, yet the time and effort required for farmers to see the results can discourage adoption. Incorporating the principles of conservation agriculture into programming can balance trade-offs and engage farmer preferences. These principles include: minimizing mechanical soil disturbance through no- or low-till through direct seed or fertilizer placement; maintaining some sort of organic cover, through crop residues, cover crops, or relay cropping; crop rotations; and diversification, through intercropping, relay cropping, or integrated fish and livestock systems. Targeting efficient fertilizer use through soil maps and knowledge transfer can maximize the productivity benefits to farmers and minimize the negative effects of fertilizer overuse. Practices enhancing soil health and water management can support the long-term health of the production system in the face of climate change, but may need to be bundled with productivity-enhancing technologies that enable farmers to see the benefits sooner.

Investing in research drives innovations such as the development of climate-adapted seed varieties, agronomic and livestock practices, postharvest loss reduction technologies, and processing solutions. By analyzing information about climate risks and impacts and producer preferences that often display gendered differences, programs can leverage and adapt agriculture research that responds to the farming system, climate risks, and economic and social conditions. For example, drought-tolerant, heat-tolerant, flood-tolerant, and pest-resistant varieties can be scaled to address current and future threats. Early maturing varieties can also help producers adapt to changing climates. Innovations like crop insurance can also help farmers manage risk and reduce losses due to climate events. Research investments can also support climate change mitigation, such as through reducing methane produced in flooded rice cultivation and approaches to lower the GHG emissions intensity of livestock.

Integrating climate change information into market systems analysis can help to identify incentives, challenges, and trade-offs faced by market actors and provide insight to engage the private sector. More fully understanding the incentives that drive public and private sector actors to engage in and invest in markets can provide entry points for investment in adaptation and mitigation. For example, bundling products like improved seeds with information like conservation agricultural practices through demonstration plots or a village-based advisor approach, where lead farmers (both men and women) are trained to support local smallholder farmers with extension and market linkages can realize profits for private sector actors, while allowing for the exchange of vital information to producers. To support adaptation, Feed the Future programs have worked with and through market actors to develop and scale climate-smart extension services, bundle drought-tolerant seeds and index-based (parametric) insurance (see the parametric insurance text box), install water retention features, and increase access to information on weather (rainfall and severe weather events) and water points for pastured livestock.

Parametric Insurance: Faster Payouts When Farmers Need Them Most

Climate change is causing more frequent, intense weather across the globe. This leads to loss of life and livelihoods, depressed economic growth, backsliding on development gains, billions needed in humanitarian assistance, and increasing risk of political instability. Early, predictable, and well-coordinated responses to shocks and stresses can mitigate negative coping mechanisms, such as reduced food consumption, livestock death, and distressed productive asset sales, as well as protect future economic growth potential. Parametric insurance products offer prespecified payouts based upon a trigger event, such as a severe drought. In 2019, Senegal experienced a catastrophic agricultural season. As part of a disaster risk financing plan, the Government of Senegal had purchased drought insurance. Given the dire conditions, a payout was triggered and families across Senegal, including those living in Ndouff Village, were able to avert extreme food insecurity with the food and cash transfers they received. In June 2019, more than 22 percent of families reported days where no one could eat. By August 2019, that number was reduced to only 2 percent of families. These programs save lives.

Bundling products with practices can also include practices that reduce emissions intensity, including agroforestry, efficient use of fertilizer, or other conservation agriculture principles. To support emissions reduction, Feed the Future activities have partnered with market actors to expand the adoption of agroforestry and products like methane digesters to create energy from manure and reduce food loss from production to market, through innovations like storage bags and moisture meters, and services such as aggregation and warehouse receipt systems. Refer to the GFSS Activity Design Guidance for Integrating a Market Systems Approach in Programming for more information.

Programming in Practice

Resilience in the Sahel Enhanced (RISE and RISE II): This initiative aims to address the root causes of chronic vulnerability, food insecurity, and malnutrition by building multiple resilience capacities in response to shocks and stressors, including climate change, conflict, migration, in a targeted zone of intervention in Niger and Burkina Faso.

Accelerated Genetic Gains in Maize and Wheat (AGG)[12] brings together partners from the global science community and national agricultural research and extension systems to accelerate the development of climate resilient higher-yielding varieties of maize and wheat—two of the world's most important staple crops. The project's maize component serves 13 countries in sub-Saharan Africa (SSA). The wheat component serves six countries in South Asia and SSA. In 2021, seed production of stress-tolerant maize varieties reached 171,127 metric tons in 13 SSA countries, covering 7.2 million hectares in 2022 planting and reaching 7.3 million households. Stress tolerant maize varieties yield 20–25% more than non-drought tolerant varieties when drought occurs.

Additional Resources and Tools

Adaptation and Assessing Climate Risks:

- Tools for Evaluating Climate Change Adaptation Program Interventions: A Toolkit.
- Climate Risk Management at the Activity Level.
- Regional and Country Risk Profiles and GHG Emissions Fact Sheets.
- ATLAS Vulnerability Assessment Approaches and Methodologies.

Clean Energy:

- USAID Clean Energy Emission Reduction (CLEER) Tool.

Climate Information Services:

- Servir Global.
- Surface Water Mapping Tool.

Climate-Smart Agriculture:

- FAO Climate Smart Agriculture Sourcebook.
- 2022 Climate Change Standard Indicator Handbook.

Estimating GHG Emissions and Evaluating GHG Mitigation Options:

- USAID Mission Analyses of Landscape Productivity Enhancement Approaches.
- USAID AFOLU Carbon Calculator.
- CCAFS Mitigation Options Tool.
- Sustainable Agriculture Decision Support Tool: Dual Purpose Cowpeas and Millet with and without Farmer-Managed Natural Regeneration in Senegal.

- Sustainable Agriculture Decision Support Tool.
- Greenhouse Gas Calculator for Cropland.
- CGIAR: A Global Methane Model for Rice Cropping Systems: Final Report.
- Low-Emissions Opportunities in Agriculture.
- Agro-Chain Greenhouse Gas Emissions (ACE) Calculator.

Livestock:

- Climate-Smart Livestock Production Strategies—FAO Climate Smart Agriculture Sourcebook.
- FAO Global Livestock Environmental Assessment Model (GLEAM).

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[12] AGG was formerly called Stress Tolerant Maize for Africa. The program was expanded to include maize and wheat and to work in more countries. Legacy program information can be found here: https://www.cimmyt.org/projects/stress-tolerant-maize-for-africa-stma/#:~:text=The%20Stress%20Tolerant%20Maize%20for,production%20across%20sub%2DSaharan%20Africa.

For further assistance related to these Activity Design Guidance documents, please contact ftfguidance@usaid.gov.