

## CLIMATE CHANGE AND FOOD SECURITY

Climate change is a critical challenge for food production around the world. As greenhouse gas concentrations rise, global temperatures are increasing, precipitation patterns are changing, and oceans are rising and becoming more acidic. These shifts are already affecting agriculture and food security, and will become more severe. In addition, decisions about where and how food is produced can either accelerate or help put the brakes on climate change.

Feed the Future, the U.S. Government's global hunger and food security initiative, is working in concert with the U.S. Global Climate Change Initiative to develop strategies and undertake research to help food producers and actors throughout the food system. These efforts aim to reduce greenhouse gas emissions and adapt to climate change so that food security can be increased despite changing climate patterns.



A Feed the Future-supported commercial horticulture farmer harvests eggplant from her field in Cambodia. Credit: Cambodia HARVEST

The economies of many rural communities throughout the developing world depend on rain-fed crops, fisheries and livestock herding – sectors that are all heavily affected by changes in climate. The U.S. Government is committed to drawing on state-of-the-art science and policy to directly address the most critical climate change risks to food security and avoid “climate-blind” investments. Three principles govern this approach, often termed **climate smart agriculture**: build resilience by sustainably boosting agricultural yields and household income; support the transition to agricultural systems that are better adapted to climate change stress; and, where appropriate, reduce greenhouse gas emissions from agricultural activities and their influence on land-use conversion. Feed the Future utilizes a **sustainable intensification** approach, which integrates research and incorporates a scientific understanding of agro-ecological systems and local knowledge in order to produce more and better quality food, stimulate economic growth and build resilience, all while achieving more efficient use of land, water and inputs.

### A Challenging Backdrop

Even without climate change, the world food system faces a challenge: Experts estimate that global food production will need to increase by at least 60 percent by 2050 to feed a growing population and satisfy shifting diets. Expanding urban areas are competing with agriculture for both land and water. And there is a limited amount of land that can be sustainably used for crop production without losing the livelihood benefits that landscapes like forests provide.

Climate change adds to this challenge. Farmers will increasingly face unfamiliar and unpredictable conditions, such as heat stress, changing seasonal rainfall patterns, infestations by diseases and pests spreading into new areas, and sea-level rise leading to saltwater intrusion into aquifers and coastal agricultural lands. Melting of mountain glaciers causes flooding and erosion in the near-term while depleting water reserves in the long-term. Many communities are also experiencing more frequent severe weather events, such as droughts and floods. Ultimately, climate change puts the sustainability of agricultural development and food security at risk and aggravates hunger and poverty, particularly where farming conditions are marginal and social safety nets are weak.

## Our Approach

Feed the Future's approach requires investing in an improved understanding of climate change impacts, developing and deploying technologies and management practices and supporting policies that encourage necessary investments and enabling environments.

**Climate change vulnerability analyses** – The U.S. Government is using the best available science and policy to help identify climate-related risks in both the short-term and the long-term. It also emphasizes identifying climate stresses along the entire value chain, including post-harvest storage, transportation and processing. This evidence helps countries identify priorities to build the resilience of the agriculture sector and ensure that the response addresses the most pressing climate challenges.

**Water and soil management** - Evidence indicates that rainfall variability is a greater challenge to farmers than the total amount of available rain. Feed the Future investments incorporate integrated watershed management and practices that respond to changing water resource availability to help upstream and downstream users in both agricultural and urban landscapes. Feed the Future also invests in regenerative soil health strategies, land tenure systems and other policies in order to help ensure that soil and water systems can support sustainable agricultural production in the face of climate change. In Senegal, with help from Feed the Future, women farmers are now practicing conservation agriculture and water harvesting techniques to restore degraded lands to productivity and profitability. Access to weather-indexed crop insurance is also helping them manage the risks of weather variability.

**Plant breeding and improved crop management** - Feed the Future's crop research projects are identifying ways to breed seeds that are tolerant to climate-related disease, heat and drought stressors to increase production while maintaining or improving nutritional quality. Feed the Future is also examining crop and animal production systems in developing countries to help ensure increased resilience at each step in the value chain – from farm to table. In Bangladesh, for example, we have introduced salt- and flood-tolerant rice varieties and more efficient fertilizer management, which reduces greenhouse gas emissions.

**Protecting livestock and fisheries** - Just like crops, livestock and fisheries are subjected to threats from a changing climate, including severe weather events, food scarcity, ocean acidification and the increasing spread of infectious animal diseases. And as with crops, smart livestock choices can reduce emissions. Feed the Future is looking for opportunities to increase productivity and reduce vulnerability by undertaking research to help livestock producers adapt and improve fisheries management. For example, Feed the Future is increasing livestock productivity and access to markets in Ethiopia and Kenya, enhancing communities' ability to adapt to more frequent droughts.

## Meeting the Global Challenge

Climate change is bringing new challenges to the agriculture sector. With cutting-edge research and innovative programming, Feed the Future and its collaborators around the world are building adaptive and resilient communities that can meet the challenges of feeding a growing global population.

- Feed the Future **integrates humanitarian and economic growth** efforts to ensure vulnerable populations are resilient to climate shocks
- Feed the Future's efforts align with the **2014 Presidential Executive Order** directing federal agencies to implement climate-resilient international development programs
- The U.S. is part of the United Nations-led **Global Alliance for Climate-Smart Agriculture**, which aims to achieve sustainable increases in agricultural productivity, greater resilience and a reduction of agriculture-related greenhouse gas emissions