

Climate Solutions



Overview:

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As a global leader in agricultural production, the United States must enhance the resilience of our agriculture and natural resources to withstand increasingly variable weather conditions and extreme weather events. This requires moving beyond traditional efficiency metrics. It is essential to prioritize productivity that regenerates soil, sustains water resources, and enhances biodiversity and community resilience. Embracing climate-smart practices, soil health principles, and advanced technologies will protect our natural resources and propel U.S. agriculture forward, thereby improving resilience and national food security.

Outcome Goals and Impacts:

- Improve yield stability and soil health through increased soil carbon sequestration, higher soil moisture content, and a 40% reduction in agriculture's carbon footprint.
- Improve nitrogen fertilizer use efficiency, minimize nutrient runoff, and enhance recycling while reducing costs of production for farmers and related greenhouse gas emissions by 35%.
- Foster new forestry land management, land cover, and harvesting approaches that promote healthy forests resilient to fire and extreme weather events, and aid in the uptake of 30% of economy-wide carbon dioxide emissions annually.
- Improve adoption of climate-smart practices and enhance resilience of agriculture, rangeland, and forest ecosystems, optimizing production amid variable, changing weather conditions and extreme weather events. Doing so can help reduce annual federal crop insurance payments by 25%, or \$3.5 billion annually.
- **Cross-cutting outcome:** Annually train an additional 20,000 students in food, agriculture, and renewable natural resources, addressing the growing demand for a skilled workforce in these sectors. Students will be recruited with diverse backgrounds and experiences reflective of the U.S. population.

Research Opportunities:

- Identify climate-smart practices that improve nitrogen use efficiency, soil fertility, structure, and resilience, enhancing our understanding of soil composition and processes.
- Reduce barriers to collaboration among farmers, communities, researchers, and policymakers to drive adoption of grassroots innovations for climate adaptation and resilience.
- Develop accurate metrics for quantifying greenhouse gas emissions, carbon sequestration, water usage, and biodiversity. Integrate climate modeling and scenario simulations to enhance the resilience of agriculture and natural resource systems.
- Apply gene-editing techniques to produce climate resilient crops and animals (e.g., improved water use efficiency, drought tolerance, heat tolerance). Develop feeds that reduce methane emissions from livestock.

Funding Requirement:

To achieve our climate solutions goals and address other societal challenges in the U.S., it's critical to allocate an additional \$1.9 billion annually in federal research funding to land-grant universities over the next decade. This annual increase is equivalent to just 1% of the total federal research and development budget.



Risk of Not Taking Action:

- From increased wildfires to water-caused crop failures, agriculture is already experiencing the impacts of variable, changing weather conditions and extreme weather events. If we fail to adapt, these challenges will exacerbate, leading to reduced crop yields and increased harm to livestock, forests, and fisheries. Biodiversity will suffer as resistant weeds, pests, diseases, and wildfires become more prevalent, disrupting ecosystems and agricultural productivity. The degradation of water, air, and soil quality will intensify and cause severe consequences for food security, human and animal health, and environmental sustainability. Immediate action is needed to safeguard agriculture systems and the health of our planet.

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