USDA, NRCS and Climate Smart Agriculture: Reducing GHG’s, Increasing Resilience, and Maintaining Productivity on Working Lands

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National Leader for Climate Change
USDA – Natural Resources Conservation Service

Air Quality Task Force Meeting
Sacramento, CA
September 8, 2016
Climate Change Impacts are occurring

- Increased drought
- Extreme Rainfall
- Increasing wildfire seasons and intensity of wildfires
- Reduction in water tables
- Increasing pests and diseases
A study in the journal Climate Change found: “found that even members of the public who are “alarmed” about a warming planet show relatively low levels of public-sphere action...”

C. Harvey, Washington Post, May 2016

From a paper entitled “Quest for Climate-proof Farms: “....(a) communication gap has long separated scientists from farmers in planning for climate change.”


From article by David Roberts, Vox.com:
“People often seem to think that clever wordsmithery is the key to good framing, but it's not even really necessary. Two things make a message stick. First, it comes from a trusted source, and second, messages stick when they are repeated.”
Collectively, universities, government, private industry and others (e.g., science, political and social leadership) have an obligation to provide a path that will prepare citizens to understand and address climate change issues – this pathway is occurring and agriculture is playing a role.
Agriculture issues – Now and in the Future

- Regional climate change and extreme weather
  - Temperature shifts (long-term and sudden)
  - Extreme storms: excessive rain/snowfall
  - Droughts: flash – seasonal – mega

- Pests – insects, diseases, invasive

- Degradation of agricultural soil and water assets
  - Air Quality
  - Soil carbon
  - Water Quantity (dryland and irrigated)
  - Water Quality (e.g., salinity, nitrates/hypoxia)
  - Erosion
Creating Resilience and Transformation In Agriculture

- Sustainability
- Environmental Protection
- Ecosystem Services (e.g., wildlife habitat, recreation, wetlands)
- Avoiding Regulation
- Yield and Profitability
- US and global food security (yield, food prices, distribution)
- Stewardship and Farmland preservation

Transforming to build a more resilient agricultural production system

Preparing for the Future
2013–

USDA recognized that farmers, ranchers and forest land managers were in need of tools, information and best management practices that can enable them to maintain or increase production and profit in light of a changing climate.

Science was not making it to the field fast enough
United States Department of Agriculture (USDA)

USDA Climate Hubs

Regional Hubs for Risk Adaptation and Mitigation to Climate Change

- Agricultural Research Service (ARS)
- US Forest Service (USFS)
- Natural Resources Conservation Service (NRCS)
- Farm Service Agency (FSA)
- Rural Development (RD)
- Animal and Plant Health Inspections Service (APHIA)
- Risk Management Agency (RMA)
- National Institute of Food and Agriculture (NIFA)
USDA Climate Hubs
Regional Hubs for Risk Adaptation and Mitigation to Climate Change

Established: February 2014
Purpose: Develop and deliver science-based, region-specific information, technologies, and program support to agricultural / natural resource managers and communities
Clientele: farmers, ranchers, forest landowners, tribes, agribusiness, and resource managers
Rationale: To make climate-informed, timely decision-making in light of the increased risks and vulnerabilities associated with a changing climate.

Hubs develop solutions for a range of time scales (seasonal to decadal) due to the varying time frames for producer issues.
Regional Focus - differences in soils, landscapes, hydrology, land use and impact of climate change
FEDERAL INTERACTIONS

- Complement and build on existing regional climate change networks (e.g., CSCs, LCCs, RISAs)
- Multiple other partners for USDA Climate Hubs:
  - NASA, State Climatologists, Universities, Extension, Crop Advisors

USDA-Focus on production agriculture, grazing systems, forest lands, and subsistence activities
Framework/Network for a USDA Regional Hub
Science and Technology providers:

Federal Partners
- NOAA RISA
- USGS CSC
- DOE
- NASA
- etc

Non-Federal Partners
- USDA Intramural Research (ARS/FS/ERS/NRCS)
- USDA Extramural funded Research (NIFA)
- Agricultural Experiment Stations
- Many others

Technology Transfer providers (Tech-Transfer Stakeholders):
- Cooperative Extension & eXtension
- USDA Service Centers
- Forest Service Threat Centers
- State Foresters
- State Climatologists
- Crop Advisors & Others

Land Management Stakeholders
- Farmers / Ranchers / Forest Managers / Tribes / States / Feds / LCCs / Others
Initial Climate Hub Actions

Build a network of partners to connect the existing pieces
Vulnerability Assessments

Eight Regional Vulnerability Assessments published Fall 2015

Vulnerability - Sensitivity of a particular system to climate changes, its exposure to those changes, and its capacity to adapt.
Catalog Tools to Deliver Climate Information to producers

- Provide usable climate science and land management tools to make farmland and forests healthier, more productive, and resilient.
AgroClimate.org--a web-resource of tools and data on climate and crops that can be used to assist with decisions about the management of agricultural systems in the Southeastern U.S.

- Seasonal Drought Outlook
- Climate Risk
- Freeze Risk
- Climate Anomaly Maps
- NWS Forecast
- ARID Monitory and Forecast

http://agroclimate.org/
USDA Partner Efforts

• AgClimate View
• Probable Fieldwork Days
• Corn GDD
• Corn N Rate Calculator
• Nitrogen Watch
Information Translation

Effects of Drought on Forests and Rangelands in the United States: A Comprehensive Science Synthesis

300-page scientific document

USDA Regional Climate Hubs: Pacific Northwest

Drought Impacts on Forests and Rangelands in the Pacific Northwest and Alaska Regions

Page dimensions: 960.0x540.0

8 regional 2-pagers
Education: Adaptive Management Resources:

- For Different perspectives
  - Forestry
  - Wildlife
  - Livestock
  - Agriculture
  - International Development

- A variety of land owners with diverse goals and objectives

- Developing useful information, tools, and tactics for resource users
Development of: Adaptation Resources for Agriculture

Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers

Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Midwest and Northeast

Maria Janowisk, Daniel Doxie, Michael Wilson, Michael Kucera, Howard Skinner, Jerry Hatfield, David Hollinger, and Christopher Swanston


Published in cooperation with USDA’s: Midwest, Northeast, and Northern Forests Climate Hubs Agricultural Research Service Natural Resources Conservation Service US Forest Service
Nov 12, 2014:
President Obama announced that by 2025 the U.S. intends to reduce GHG emissions by 26 to 28 percent below 2005 levels.
GREENHOUSE GAS EMISSIONS FROM AGRICULTURE

Figure 5-1: 2014 Agriculture Chapter Greenhouse Gas Emission Sources (MMT CO₂ Eq.)

- Ag soil Management: N₂O (318 MMT CO₂ Eq.)
- Enteric Fermentation: CH₄
- Manure Management: CH₄
- Rice Cultivation: <0.5 MMT CO₂ Eq.
- Field Burning of Ag Residue: <0.5 MMT CO₂ Eq.

Total 2014 US emissions = 6,870.5 MMT CO₂ Eq

2014 Ag emissions = 573.6 MMT CO₂ Eq

2014: Agriculture contributes 8.3 percent of total U.S. greenhouse gas emissions.
USDA Conservation Programs

• Voluntary
• Provide technical and financial assistance
• Partnership driven (e.g., Conservation Innovation Grants, Regional Conservation Partnership Program)
• Addressing state and local conservation priorities
  • vulnerable soils/regions
  • wildlife conservation areas
  • urbanizing/endangered lands

Use conservation programs to assist farmers in profitability, resiliency, and protection of natural resources
NRCS—A pioneer in conservation for over 80 years, working with landowners, local and state governments, tribes, and other federal agencies to maintain healthy and productive working landscapes.
Background for USDA Action

• USDA is well-positioned to contribute since:
  • Farmers and ranchers can:
    • Reduce GHG emissions
    • Store carbon
  • On-going conservation efforts of agencies, for example
    • Soil Health Initiative
    • Forest Restoration
    • Climate Change Adaptation

USDA Building Blocks for Climate Smart Ag and Forestry

Building Blocks Lead: USDA Climate Change Program Office
Agencies: NRCS, USFS, RD, FSA, ARS, NIFA, ERS, RUS
USDA Announcements

• **April 23, 2015** - Secretary’s announcement at Michigan State Univ for the USDA Building Blocks for Climate Smart Agriculture and Forestry

• **Dec 12, 2015** – COP 21 International Climate Agreement (UNFCCC) in Paris

• **May 12, 2016**  Secretary released a roadmap for the Building Blocks
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<tr>
<th>Building Block</th>
<th>Goals by 2025</th>
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<tbody>
<tr>
<td>Soil Health</td>
<td>Promote conservation practices that improve SOM, reduce emissions from soils/equipment</td>
</tr>
<tr>
<td>Nitrogen Stewardship</td>
<td>Reduce N$_2$O emissions and provide cost savings through application of 4 “Rs”</td>
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<tr>
<td>Livestock Partnerships</td>
<td>Use anaerobic digesters &amp; impermeable covers on dairy and swine operations</td>
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<td>Conservation of Sensitive Lands</td>
<td>Conservation Reserve Program and Easements to protect wetlands and organic rich soils</td>
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<td>Grazing and Pasture Lands</td>
<td>Establish grazing management plans on an additional 9 M acres</td>
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<td>Private Forest Growth and Retention</td>
<td>Through FLP and CFP, protect almost 1 M acres of working landscapes</td>
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<td>Stewardship of Federal Forests</td>
<td>Reforest 32,000 acres per year on National Forest System lands</td>
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<td>Promotion of Wood Products</td>
<td>Increase the number of wooden building projects</td>
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<td>Urban Forests</td>
<td>Plant 100,000 additional trees in urban areas</td>
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<tr>
<td>Energy Generation and Efficiency</td>
<td>Promote renewable energy technologies and improve energy efficiency</td>
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<tr>
<td>Total</td>
<td>~122-136 MMT CO$_2$e</td>
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Highlight Two Building Blocks

- Soil Health
- Nitrogen Stewardship

### Building Block Goals and Key Actions

<table>
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<tr>
<th>Building Block</th>
<th>Goals (by 2025)</th>
<th>Greenhouse Gas (GHG) Reduction Goal (MMTCO₂e per year by 2025)</th>
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<tbody>
<tr>
<td>Soil Health</td>
<td>Integrate with the NRCS Soil Health Initiative and promote more than 10 NRCS conservation practices that improve soil organic matter, reduce emissions from soils and equipment, and promote healthier soils nationwide.</td>
<td>4.0-18.0</td>
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<tr>
<td>Nitrogen Stewardship</td>
<td>Reduce nitrous oxide emissions and provide cost savings by focusing on the right timing, type, placement, and quantity of nutrients.</td>
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Soil Health

• **Soil Health Monitoring and Enhancement Network**

• **Training:**
  - Advanced soil health training course and complementary webinar series to train trainers, train >2,000 field, area, and state technical staff

• **Certification** requirements for soil health management planners.
Soil Health

• **Partnerships:** to develop standardized comprehensive soil health assessment availability and economic data.

• **Conservation Practice Standards**—Review and update related to soil health management systems (SHMS).

• **Investment:** Continue to invest in research, education, and extension on practices that promote soil health and reduce GHG emissions from cropland.
Soil Health Management Systems

Conservation buffers

Conservation Tillage

Cover Crops

CO₂

Soil organic matter

Nutrient Management

Water Management

Avoided Grassland Conversion (CRP)

Improved Rotations
Farmer-led Movement for Soil Health Receives $4 Million Boost

Funding will accelerate Soil Health Partnership’s efforts to show farmers economic benefits of sound agriculture practices

Building Blocks Involve Partners

An NCGA Initiative

Support from
Monsanto
Natural Resources Conservation Service
United Soybean Board
The Walton Family Foundation

With Technical Support From
The Environmental Defense Fund
The Nature Conservancy

Midwest Row Crop Collaborative

Members

- Cargill
- Environmental Defense Fund
- General Mills
- Kellogg Company
- Monsanto Company
- PepsiCo
- The Nature Conservancy
- Walmart
- World Wildlife Fund – US
Nitrogen Stewardship
Building Block
Goal - Reduce 7 MMT CO₂e from Nitrogen Applications Annually

Enroll and maintain a total of 64 million acres of crop and pasture land under an enhanced nitrogen management plan designed to mitigate N₂O emissions

- Requires improving nutrient management on 4.5 million new acres each year from 2016 through 2025
- **AND** requires 75% of these new acres be maintained under an Enhanced 4R Nutrient Management Plan
Nitrogen Stewardship – 4R Approach

Enhanced Nitrogen Management – applying 4R principles - right time, right place, right rate, and using the right source

- Benefits extend beyond N₂O emissions
  - Reduced potential for nutrient runoff, resulting in improved local water quality
  - Improved nutrient use efficiency may reduce amount of fertilizer applied, thus reducing fertilizer costs without impacting yield; creating a “win-win” for producers
  - Expected 75% of acres converted to enhanced nutrient management will continue – “nitrogen management conservation legacy effect”
Nitrogen Stewardship – Challenges

Weather—impact N losses/efficiency

Soil Health—Increase soils abilities to cycle N

Nitrogen Application-time, place, rate, source
Nitrogen Stewardship – Focus

- Priority placed on enhanced nitrogen management for corn production to mitigate N\textsubscript{2}O emissions
- N\textsubscript{2}O emission reduction quantification methodologies for corn rotations and new dynamic modeling approaches will improve measurement and mitigation of emissions in the future

Corn production in the US represents the largest use of nitrogen fertilizer, thus has largest potential for N\textsubscript{2}O emission reductions
Nitrogen Stewardship – How?

To accomplish 64 million acres of crop and pasture land under an enhanced nitrogen management plan designed to mitigate N₂O emissions, NRCS will need to:

- Prioritize efforts in major corn producing states
- Continue/Increase NRCS technical and financial assistance
- Recruit and train additional Technical Service Providers (TSPs), which will provide direct technical assistance to producers
- Acquire additional TSP funding
- Prioritize use of nutrient management conservation activity plan (CAP 104)
- Develop partnerships with ag industry, especially agronomic consultants and ag retailers
Whole farm and ranch GHG accounting tool

Two purposes
- Document results
- Track progress toward the goals

Two parts
- Practice and technology data
- Greenhouse gas calculations

Tracking both direct impacts of USDA actions and indirect effects of practice and technology diffusion

A national look at carbon landscapes and a central location for USDA Carbon Inventory, modeling, and mapping of terrestrial biosphere carbon
NRCS Commitment for USDA Building Blocks – 2016 Additional EQIP Funding

- Additional $72.3 million in EQIP financial assistance (FA) and technical assistance (TA) to states
- Targeted funds for conservation practices that align to GHG Building Blocks
- Increase soil organic C (carbon sequestration) and reduce GHG emissions associated with food and fiber production.
- Same practices will also increase resilience of soils and cropping systems against the impacts of climatic variability and extreme weather events

California received $4.73 million from this EQIP fund
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Thanks

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