US Story: Building community and climate resilience with the USDA Climate Hubs

Lynn G. Knight
National Climate Hubs Lead (acting)

U.S. DEPARTMENT OF AGRICULTURE

Translating climate science into action

USDA Climate Hubs

Mission: …to develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers that enable climate-informed decision-making, and to provide access to assistance to implement those decisions.

Agricultural Research Service

NRCS Natural Resources Conservation Service

Forest Service U.S. Department of Agriculture

APHIS

FSA Farm Service Agency

RMA

USDA Foreign Agricultural Service
U.S. Department of Agriculture

Partnerships: strengthening regional collaboration

- We *connect* and work with a wide range of USDA partners including federal and state agencies, Cooperative Extension, and Tribes.
- We *coordinate* with other regional climate service providers
- We *collaborate* and *co-produce* climate information and resources to support resilient landscapes and resilient communities.

How we work

Science and data syntheses

Translating and delivering relevant information

Technology/tool development and support

Supporting climate-informed planning and decision-making

Outreach, convening, and training

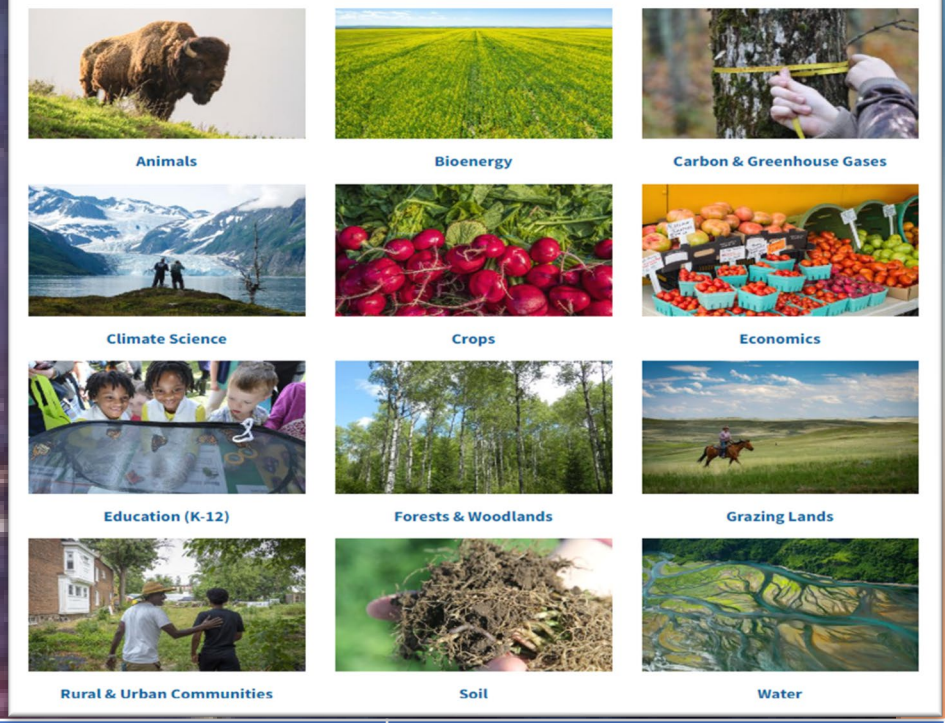
Facilitating engagement, discovery, and exchange

The USDA Climate Hubs are a premier model for developing and delivering climate information and services to agricultural and natural resource managers alongside USDA and its partners. The Hubs are a force multiplier for our USDA service providers leveraging the Department's joint capacity to have greater impact.

International Climate Hub

More information will be presented by USDA on December 11th at 11:45 am in Dubai at US Pavilion

Barbara Bennett – International Climate Hub Director
Barbara.Bennett1@usda.gov



Mission

To translate agricultural climate science, tools, and information into action on a **global** scale.

Collaboration

- Highlight international climate research and information.
- Share U.S. experiences with international audiences.
- Serve as global resource

Key Tools

- COMET-Planner Global --Helps global farmers predict GHG emission reductions from using climate smart practices
- GADAS--Helps assess global climate hazards & their impact on agriculture

Engagement

- Webinars for International Audiences
- Facilitation of international cooperative work.

Examples of our Work

- Work with Vietnam - Software for optimized climate-smart cattle rations
- Work with Tanzania on solar powered drip irrigation.
- Work with Brazil on fertilizer alternatives

Connect with us!

climatehubs.usda.gov

@USDAClimateHubs

Lynn Knight
Lynn.Knight@usda.gov

Caiti Steele
Caiti.Steele@usda.gov

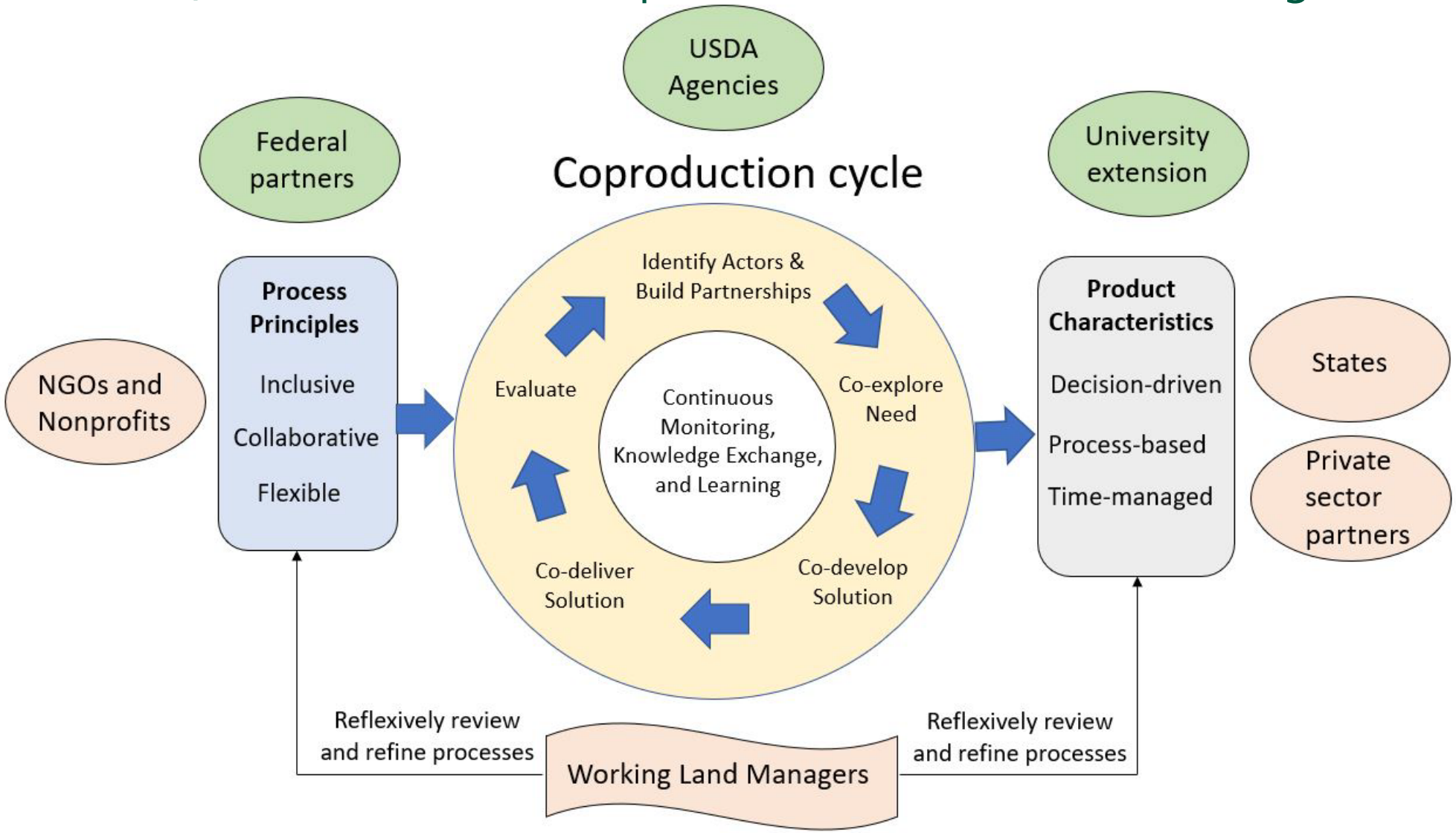
Resources and additional Information:

(additional slides at end of this presentation provide more information on what we do!)

Climate Hubs' value-add

- Linking science to programs and managers
  - Serving as "connectors"
- Building mutual literacy in climate science and working lands
- Assessing climate vulnerabilities pre and post disaster
- Providing tested and effective adaptation planning and implementation
- Building relationships and networks
  - Convening interdisciplinary research teams linking biophysical and socioeconomic expertise, and integrating community/producer perspectives

The Hubs were established to improve information flow *to* stakeholders by translating science into actionable, decision-relevant tools and products and improve the information flow *from* stakeholders to provide feedback to research agencies.



Science and data synthesis

- The Climate Hubs assess and synthesize regional climate risks and vulnerabilities
- Syntheses provide:
  - foundational knowledge on climate risks
  - adaptation and mitigation efforts
  - help promote conservation and climate-smart practices that build resilience

Climate Hub staff contributed to the Fifth National Climate Assessment as chapter leads, authors, technical contributors and technical reviewers

Vulnerability Assessments of U.S. Agriculture and Forests (2018)

Agricultural Vulnerabilities in the Northeast

Drought Vulnerability Assessment to Inform Grazing Practices on Rangelands

Northern Forests Vulnerability

https://www.climatehubs.usda.gov/actions-and-resources/assessments

Science and data synthesis

Economic dimensions of soil health

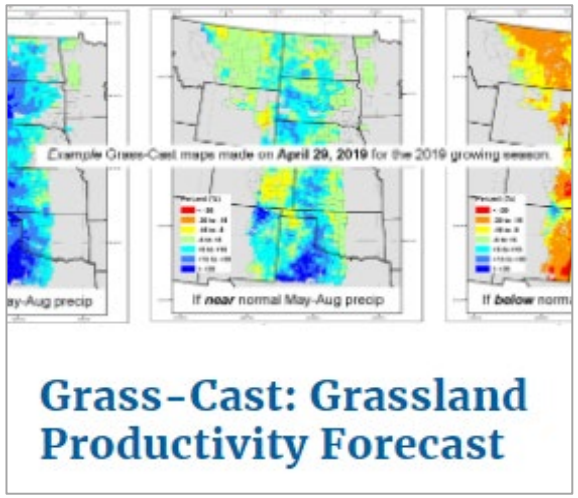
- Northeast Climate Hub using long-term data from LTAR and others to evaluate the economics of both no-till and cover crops.
- This type of long-term economic outcome data can help determine potential incentives for farmers.
- Understanding the motivations for adopting proper soil health management strategies could increase adoption.

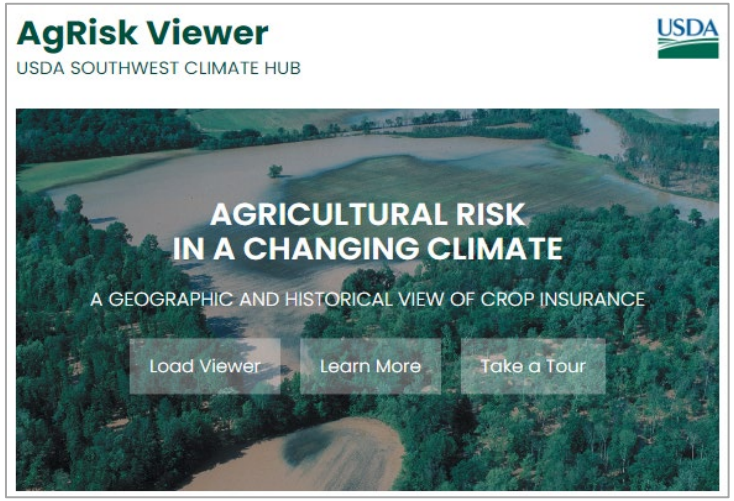
Economic dimensions of soil health practices that sequester carbon: Promising research directions

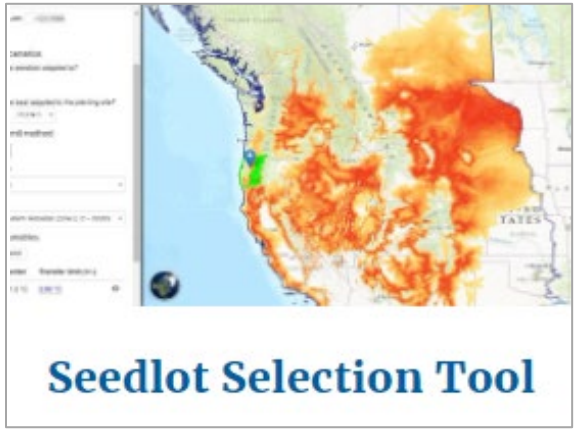
Roderick M. Rejesus, Serkan Aglasan, Lynn G. Knight, Michel A. Cavigelli, Curtis J. Dell, Erin D. Lane, and David Y. Hollinger

Tools and technology

- The Climate Hubs and their partners develop decision support tools to help track and respond to climate change and its impacts
  - **Grass-Cast** is a rangeland forage forecast system.
  - **AgRisk Viewer** provides visually accessible crop insurance loss data.
  - **Freeze Date Tool** helps producers manage shifts in in the growing season.
  - **Seedlot Selection Tool** helps foresters, landowners, and land managers consider climate change when planning reforestation and afforestation projects.





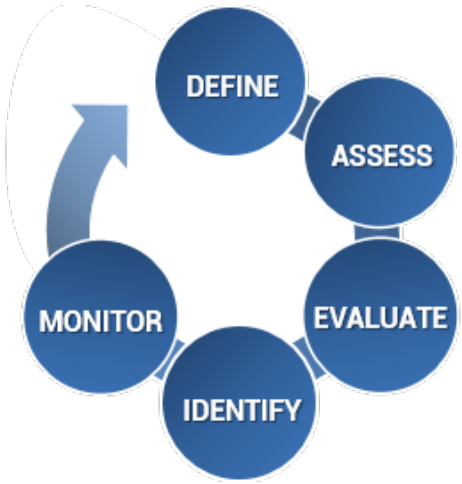


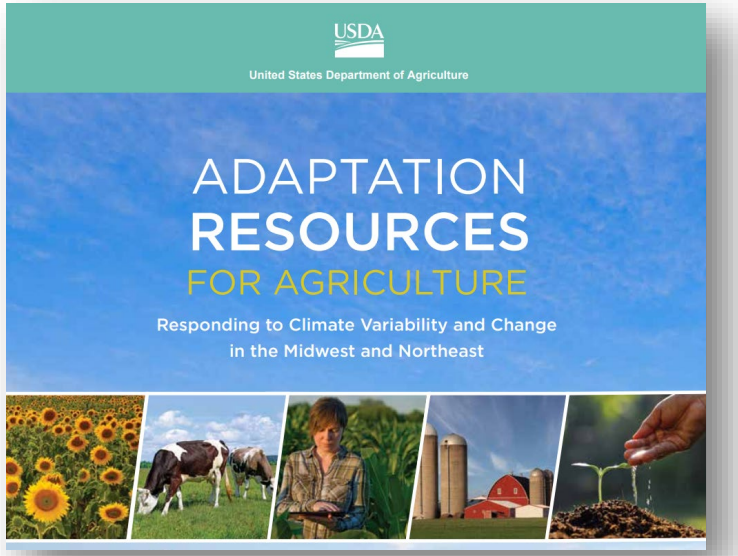
https://www.climatehubs.usda.gov/tools

Tools and technology: The Adaptation Workbook

- A **structured adaptation planning process** w/ menus
- Offers management scenarios to help land managers respond to climate change risks
- Covers sectors important to forestry and rural communities and their resilience
  - Forest, Forested Watersheds, Forest Carbon Management, Fire, Non-forested Wetland Conservation, Recreation, Agriculture, and Wildlife Management

- *Adaptation Resources for Agriculture* helps producers consider both short-term adaptive management actions and long-range strategic plans



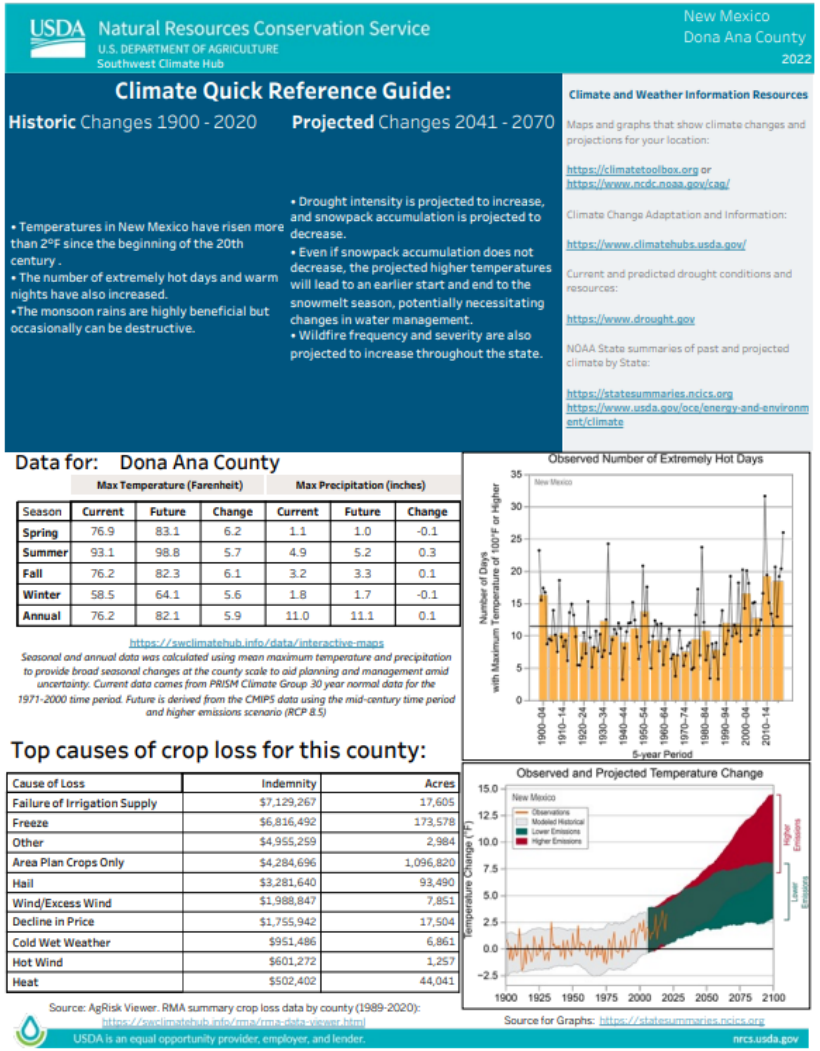


https://forestadaptation.org/

Tools and technology: Climate Quick Reference Guides

Climate Quick Reference Guides give information on key changes in historic and projected climate most impactful to agricultural production in a selected US county or State.

The main sources of data used in the guides are 2022 NOAA State Summaries and USDA Risk Management Agency data analyzed through the Southwest Climate Hub's AgRisk Viewer, and other published climate change data



USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE
Southwest Climate Hub

New Mexico
Dona Ana County
2022

Climate Quick Reference Guide:

Historic Changes 1900 - 2020

- Temperatures in New Mexico have risen more than 2°F since the beginning of the 20th century .
- The number of extremely hot days and warm nights have also increased.
- The monsoon rains are highly beneficial but occasionally can be destructive.

Projected Changes 2041 - 2070

- Drought intensity is projected to increase, and snowpack accumulation is projected to decrease.
- Even if snowpack accumulation does not decrease, the projected higher temperatures will lead to an earlier start and end to the snowmelt season, potentially necessitating changes in water management.
- Wildfire frequency and severity are also projected to increase throughout the state.

Climate and Weather Information Resources

Maps and graphs that show climate changes and projections for your location:
https://climatetoolbox.org or https://www.ncdc.noaa.gov/cag/

Climate Change Adaptation and Information:
https://www.climatehubs.usda.gov/

Current and predicted drought conditions and resources:
https://www.drought.gov

NOAA State summaries of past and projected climate by State:
https://statesummaries.ncics.org
https://www.usda.gov/oce/energy-and-environment/climate

Data for: Dona Ana County

	Max Temperature (Farenheit)			Max Precipitation (inches)		
Season	Current	Future	Change	Current	Future	Change
Spring	76.9	83.1	6.2	1.1	1.0	-0.1
Summer	93.1	98.8	5.7	4.9	5.2	0.3
Fall	76.2	82.3	6.1	3.2	3.3	0.1
Winter	58.5	64.1	5.6	1.8	1.7	-0.1
Annual	76.2	82.1	5.9	11.0	11.1	0.1

https://swclimatehub.info/data/interactive-maps

Seasonal and annual data was calculated using mean maximum temperature and precipitation to provide broad seasonal changes at the county scale to aid planning and management amid uncertainty. Current data comes from PRISM Climate Group 30 year normal data for the 1971-2000 time period. Future is derived from the CMIP5 data using the mid-century time period and higher emissions scenario (RCP 8.5)

Observed Number of Extremely Hot Days

Top causes of crop loss for this county:

Cause of Loss	Indemnity	Acres
Failure of Irrigation Supply	$7,129,267	17,605
Freeze	$6,816,492	173,578
Other	$4,955,259	2,984
Area Plan Crops Only	$4,284,696	1,096,820
Hail	$3,281,640	93,490
Wind/Excess Wind	$1,988,847	7,851
Decline in Price	$1,755,942	17,504
Cold Wet Weather	$951,486	6,861
Hot Wind	$601,272	1,257
Heat	$502,402	44,041

Observed and Projected Temperature Change

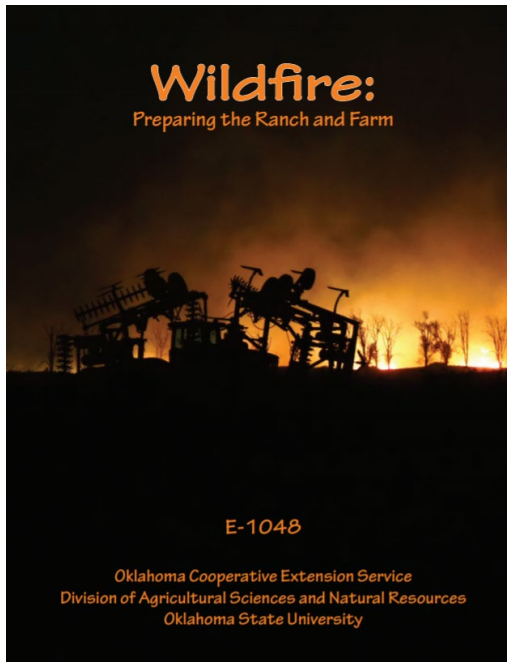
Source: AgRisk Viewer. RMA summary crop loss data by county (1989-2020): https://swclimatehub.info/rma/rma-data-viewer.html

Source for Graphs: https://statesummaries.ncics.org

USDA is an equal opportunity provider, employer, and lender. nrcs.usda.gov

https://webapps.jornada.nmsu.edu/climate-quick-guides

Outreach and Education: Disaster preparedness



The Southern Plains Climate Hub co-developed a farmstead wildfire preparedness factsheet.

The Southeast Climate Hub developed **23 commodity guides** to help producers prepare for and recover from hurricane events.

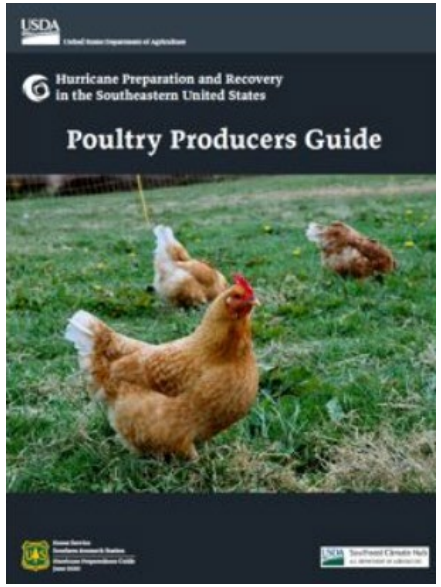
Learning from disasters

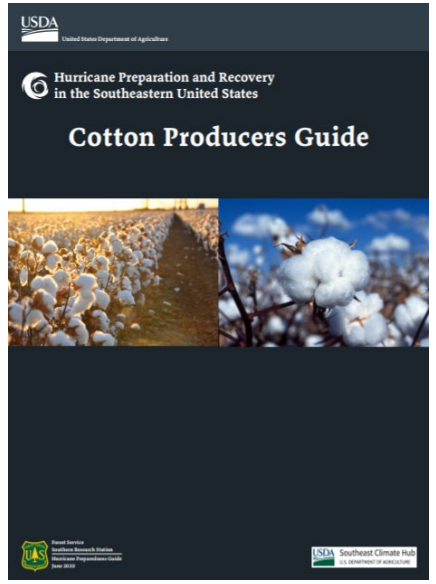
- Science assessments and synthesis from our Caribbean Climate Hub improve understanding of sector-specific vulnerabilities to hurricanes and how to reduce risks and costs from future storms.
- Key findings include:
  - Variable socio-ecological effects
  - Loss of power, water, and downed trees as cascading consequences

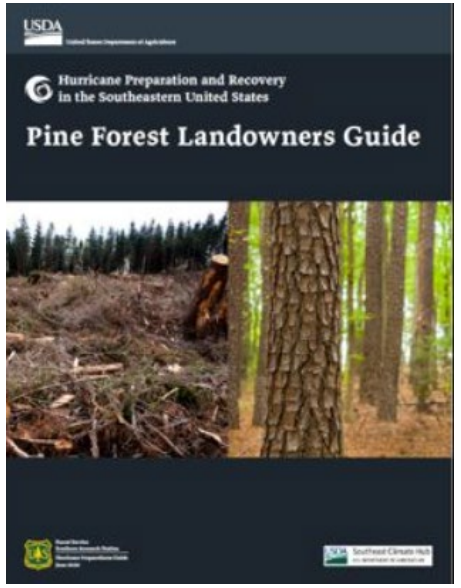
Agricultural Advisors Identify Gaps and Challenges in Future Hurricanes Preparedness and Recovery

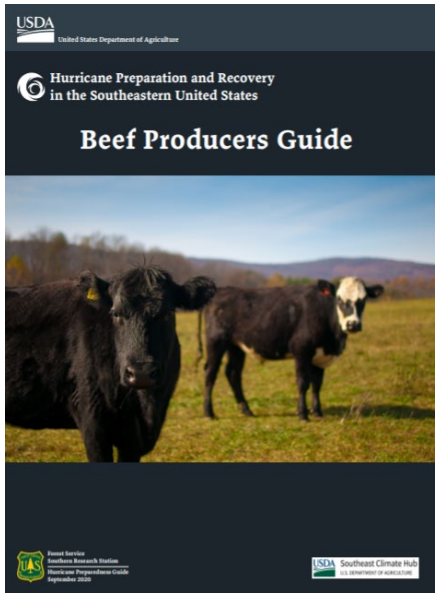
Disaster Preparedness

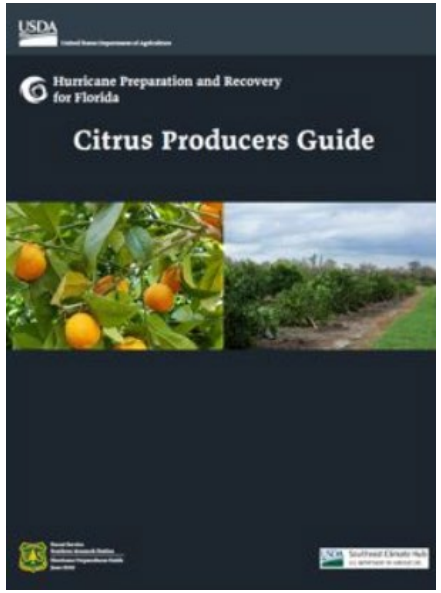
- The **Southeast Climate Hub** developed 23 commodity guides to help producers prepare for and recover from hurricane events.
- In partnership with university extension and USDA agencies, these guides highlight resources by state and commodity.
- The guides provide more than 1000 pages of useful and usable information for increasing the resilience of working lands to hurricane impacts.

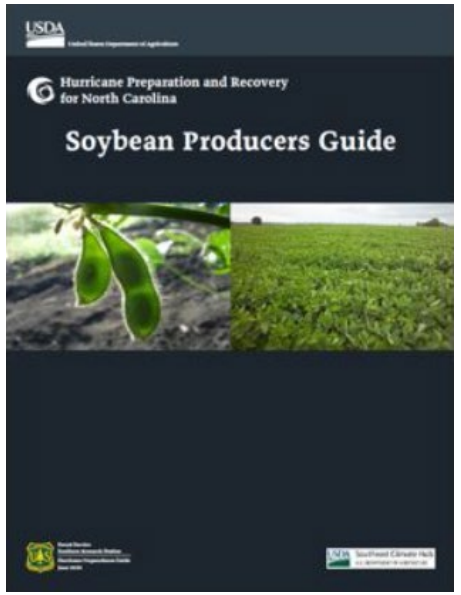












Reaching diverse communities

- Through the Hubs' assessments, tools, and technologies, they can **identify opportunities to ensure equitable access** to USDA research and programs.
- Justice 40 initiative a key priority
- NIFA $9 million investment for FY21 in Hub and extension partnerships including expanding engagement in underserved areas

Outreach: multimedia

Delmarva and the Ground for Change

- This film follows three different family-owned farming operations on the Delmarva Peninsula who all care about and depend on soil.
- Practices span no-till farming, cover crops, subsurface irrigation, rotational grazing, and soil carbon sequestration.
- These practices protect and promote healthy soils, and safeguard operations against extremes posed by climate change.

Peer-to-peer learning

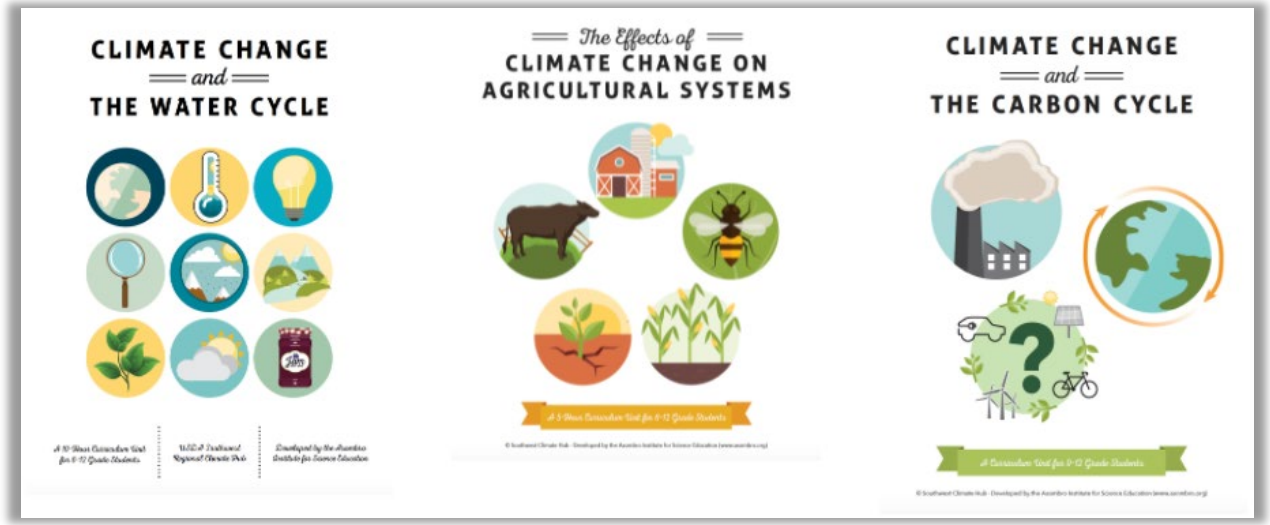
Drought Learning Network: Consortium of climate service providers and resource managers who share critical drought-related knowledge and lessons learned to build resilience and response to future drought.

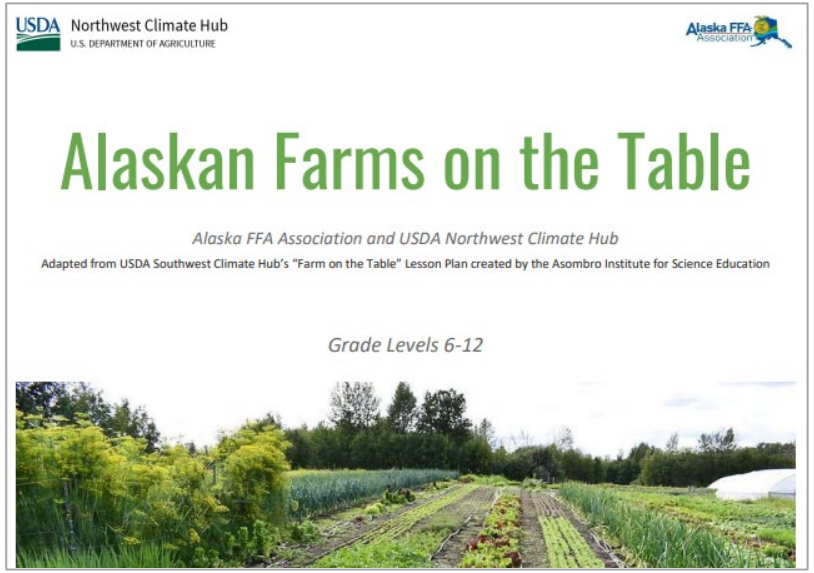
Climate Adaptation Fellowship: Program pairs farmers and extension advisors to develop personalized adaptation plans to reduce risk + build resilience.

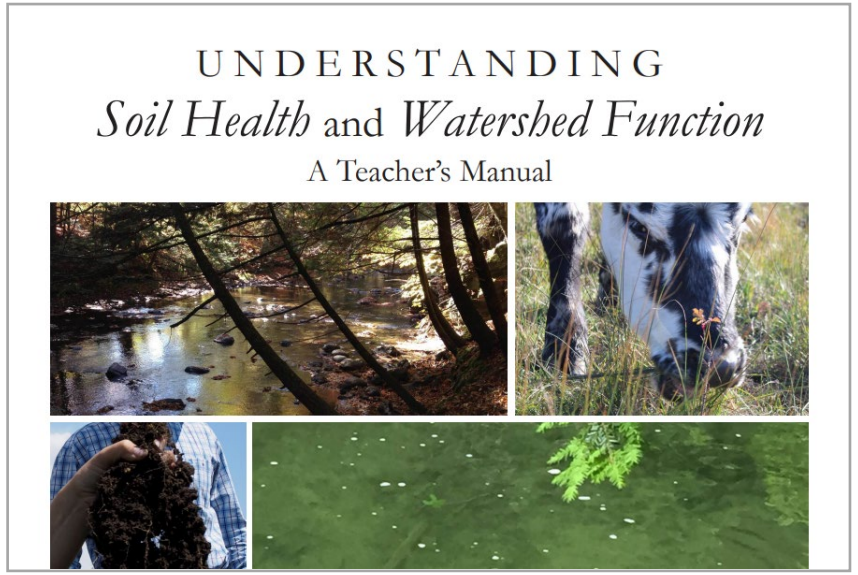
Climate Learning Forum: Listening and learning sessions among staff from the Natural Resources Conservation Service (NRCS), extension, and agricultural service providers to understand opportunities and barriers to adoption of climate adaptation and mitigation practices.

Building climate literacy

- Climate Hubs have produced [education modules](#) to support climate literacy efforts understanding that children can be effective agents of change.
- The Climate Hubs' efforts provide "off-the-shelf", flexible products that can be used in classrooms across the Nation.







Current and future investments

- NIFA's Extension, education, and USDA Climate Hubs Partnership
  - $9m in FY21 and FY22
  - Support projects that provide effective, translatable, and scalable approach to address climate change through regional partnerships including the Climate Hubs and extension.
  - *Enhance extension's role as a force multiplier*
- Hiring and on-boarding of 23 new Climate Hub Fellows (ARS/FS)
- Peer-to-peer learning networks
  - Drought Learning Network
  - Climate Conversations
- Focus on underserved communities/Justice 40 initiative
- International Climate Hub

Opportunities

- USDA Climate Hubs provide syntheses, assessments, tools, and outreach that build climate awareness and knowledge.
- Climate Hubs are connectors. They also convene and bring partners to the table to promote collaboration and coproduction, and importantly *listen* and *learn*.
- Enhancing partnerships and collaborative capacity in timely and relevant areas (e.g., soil carbon, agroforestry).
- Expanding tool and technology development and implementation.