

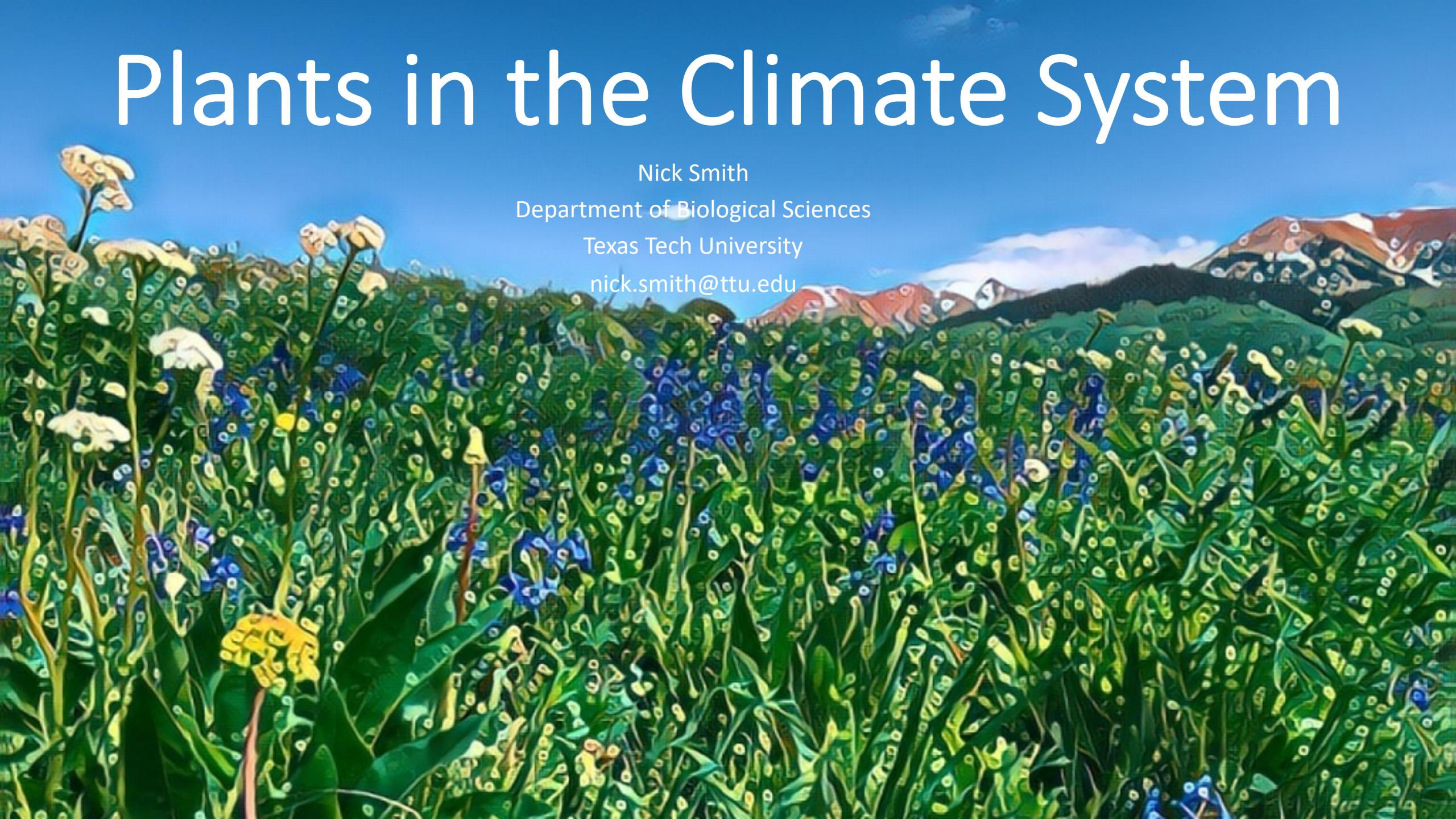
Plants in the Climate System

Nick Smith

Department of Biological Sciences

Texas Tech University

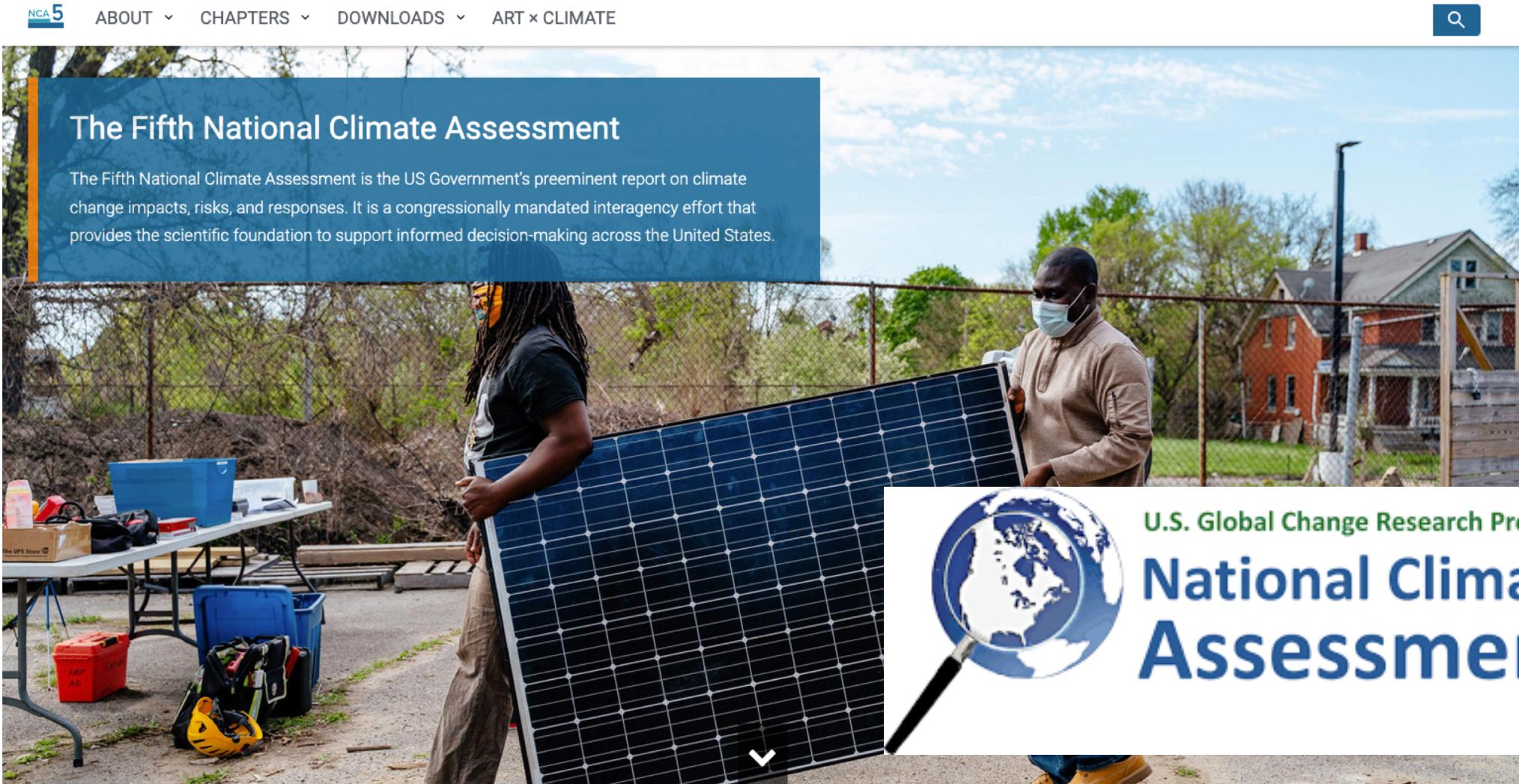
nick.smith@ttu.edu



Something important happened
yesterday...



On Nov. 14, 2023 the 5th National Climate Assessment (NCA5) was released!



The screenshot shows the homepage of the NCA5 website. At the top, there is a navigation bar with links for "ABOUT", "CHAPTERS", "DOWNLOADS", and "ART × CLIMATE". A search icon is also present. The main content area features a large image of two Black men wearing face masks, working together to install a large solar panel on a metal frame. In the background, there's a chain-link fence and some residential buildings under a blue sky with white clouds. To the left of the image, a sidebar contains the title "The Fifth National Climate Assessment" and a brief description: "The Fifth National Climate Assessment is the US Government's preeminent report on climate change impacts, risks, and responses. It is a congressionally mandated interagency effort that provides the scientific foundation to support informed decision-making across the United States." Below the image, the logo for the "U.S. Global Change Research Program National Climate Assessment" is displayed, featuring a magnifying glass over a globe.

NCA5

ABOUT ▾ CHAPTERS ▾ DOWNLOADS ▾ ART × CLIMATE

The Fifth National Climate Assessment

The Fifth National Climate Assessment is the US Government's preeminent report on climate change impacts, risks, and responses. It is a congressionally mandated interagency effort that provides the scientific foundation to support informed decision-making across the United States.

The U.S. Global Change Research Program
National Climate Assessment

What is NCA5?

- US government report
 - Congressionally mandated and overseen by multiple agencies
 - Delivered to congress and the president
- Climate change impacts, risks, and responses for USA
- Provides scientific foundation for decision making
- Policy relevant, but not policy prescriptive



What is NCA5? Mandate

- Result of the Global Change Research Act of 1990
- Every 4 years a report that “analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years”



What is NCA5? Review process

- Reviewed by:
 - Federal government experts
 - External experts
 - General public
 - External reviewers from NASEM
- Review by each group multiple times throughout the process
- All reviews responded to



What is NCA5? Audience

- Audience: decision makers
 - national, state, local, and Tribal governments, city planners, public health officials, adaptation specialists, nurses, farmers, business owners, community organizers, researchers, water utilities, ecosystem managers, educators, students, the media, and concerned individuals



What is NCA5? Structure

- Each chapter has list of key messages
 - Conclusions based on authors' expert judgment and synthesis of the assessed information sources
 - Often present findings in the context of risks to natural and/or human systems
- Confidence and Likelihood
 - Calibrated terms in key messages
 - Confidence: based on the type, amount, quality, strength, and consistency of evidence; the skill, range, and consistency with which models can attribute, and interpret climate trends; and the quality of scientific information sources.



What is NCA5? Confidence and Likelihood

- Calibrated terms in key messages
 - **Confidence**: based on the type, amount, quality, strength, and consistency of evidence; the skill, range, and consistency of methods to detect, evaluate, attribute, and interpret climate trends; and the degree of agreement across scientific information sources
 - **Likelihood**: based on measures of certainty expressed probabilistically



What is NCA5? Content

- Four categories of chapters
 - Overview chapter (Ch. 1)
 - Physical science chapters (Ch. 2-3)
 - National topics chapters (Ch. 4-20)
 - Regional chapters (Ch. 21-30)
 - Response chapters (Ch. 31-32)



[About this Report](#)[Guide to this Report](#)

OVERVIEW

PHYSICAL SCIENCE

[2. Climate Trends](#)[3. Earth Systems Processes](#)

NATIONAL TOPICS

[4. Water](#)[5. Energy](#)[6. Land](#)[7. Forests](#)[8. Ecosystems](#)[9. Coasts](#)[10. Oceans](#)[11. Agriculture](#)[12. Built Environment](#)[13. Transportation](#)[14. Air Quality](#)[15. Human Health](#)[16. Indigenous Peoples](#)[17. International](#)[18. Complex Systems](#)[19. Economics](#)[20. Social Systems and Justice](#)

REGIONS

[21. Northeast](#)[22. Southeast](#)[23. US Caribbean](#)[24. Midwest](#)[25. Northern Great Plains](#)[26. Southern Great Plains](#)[27. Northwest](#)[28. Southwest](#)[29. Alaska](#)[30. Hawai'i and US-Affiliated Pacific Islands](#)

RESPONSES

[31. Adaptation](#)[32. Mitigation](#)

FOCUS ON

[F1. Compound Events](#)[F2. Western Wildfires](#)[F3. COVID-19 and Climate Change](#)[F4. Risks to Supply Chains](#)[F5. Blue Carbon](#)

APPENDICES

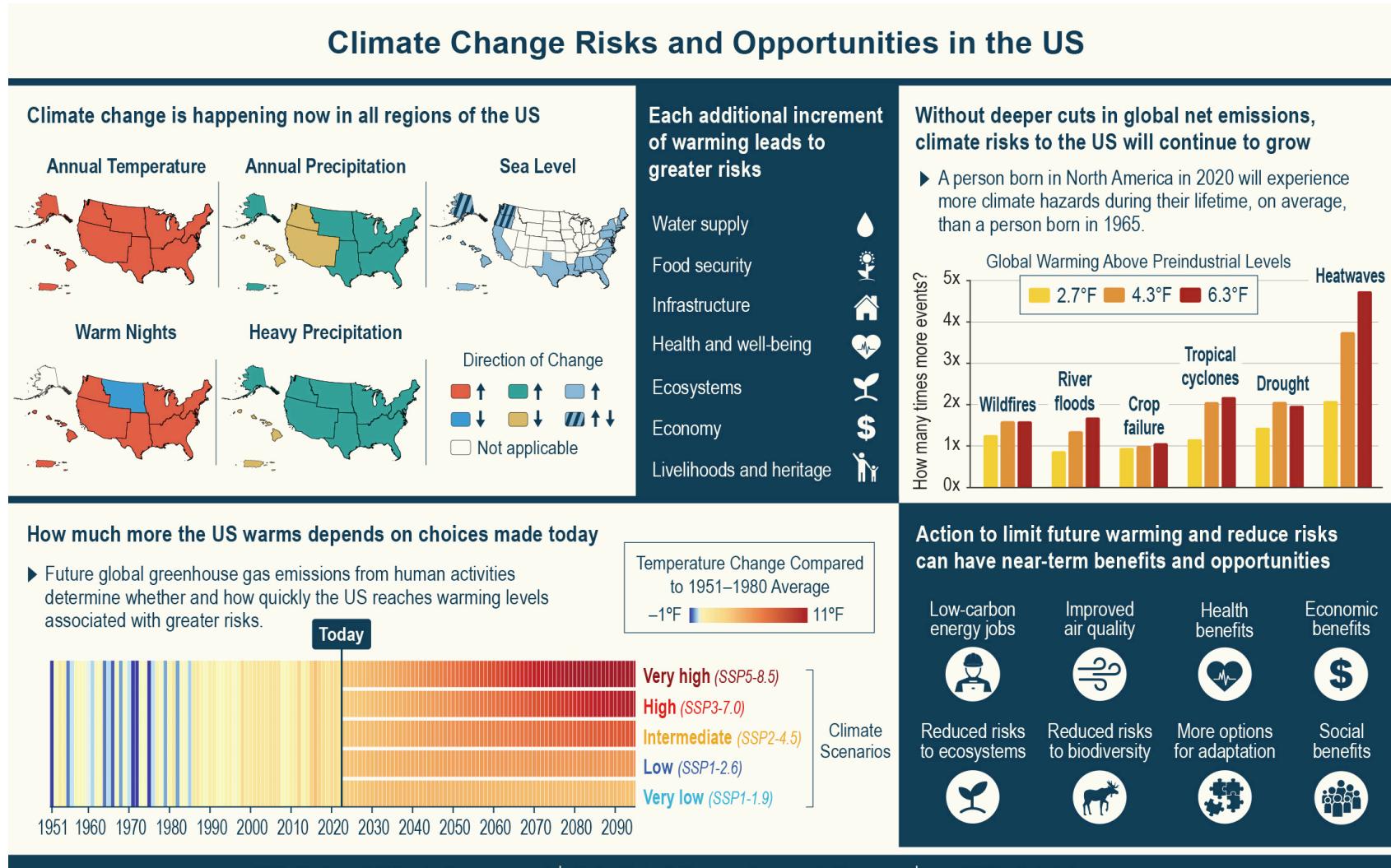
[A1. Process](#)[A2. Information Quality](#)[A3. Scenarios and Datasets](#)[A4. Indicators](#)[A5. Glossary](#)[All Figures](#)[All Key Messages](#)

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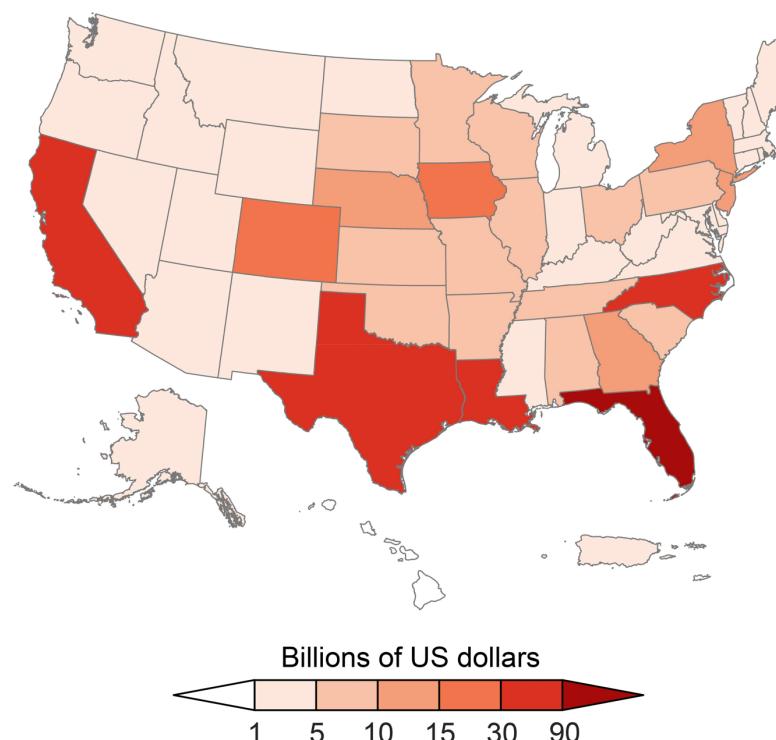


The effects of climate change are worsening, but depend on decisions we make today

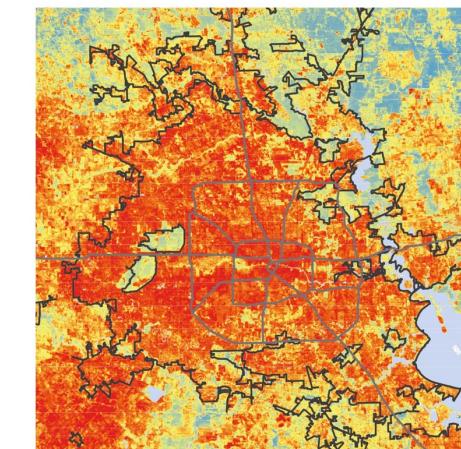


Climate change is harming people, with disproportionate effects on underserved and overburdened communities

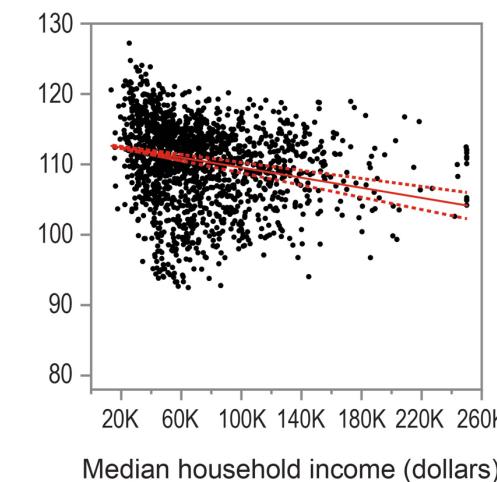
Damages by State from Billion-Dollar Disasters
(2018–2022)



b) Houston, TX

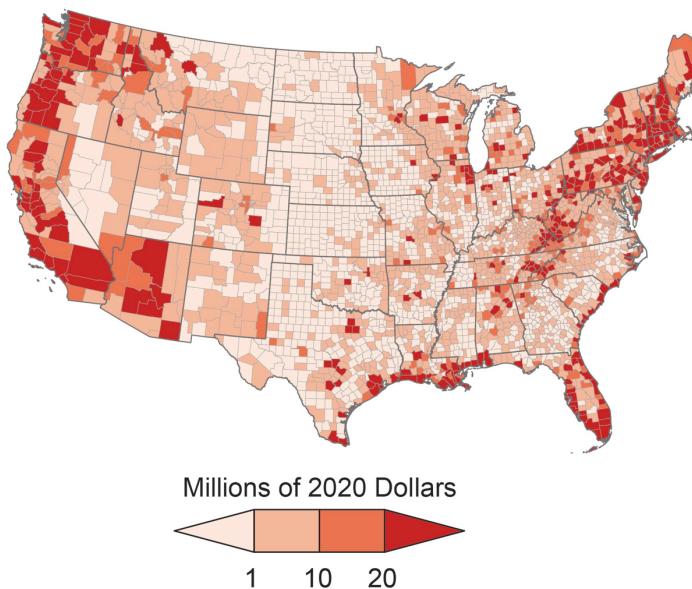


e) Houston, TX

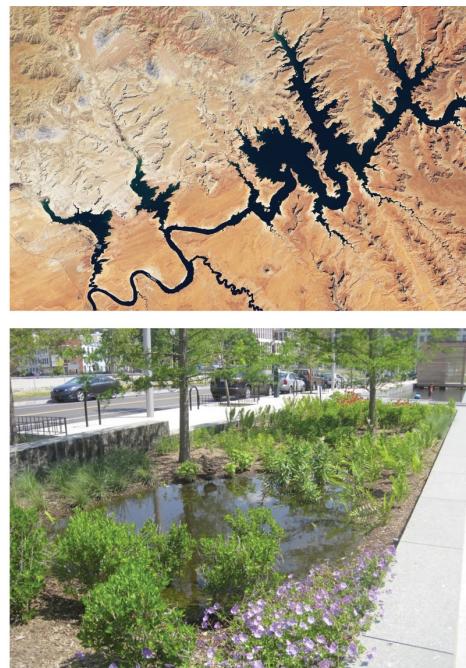
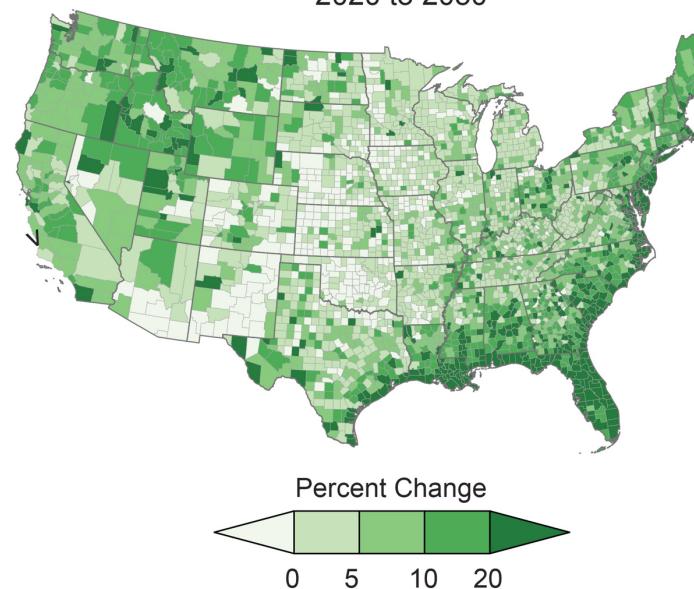


Climate change is making life harder for people

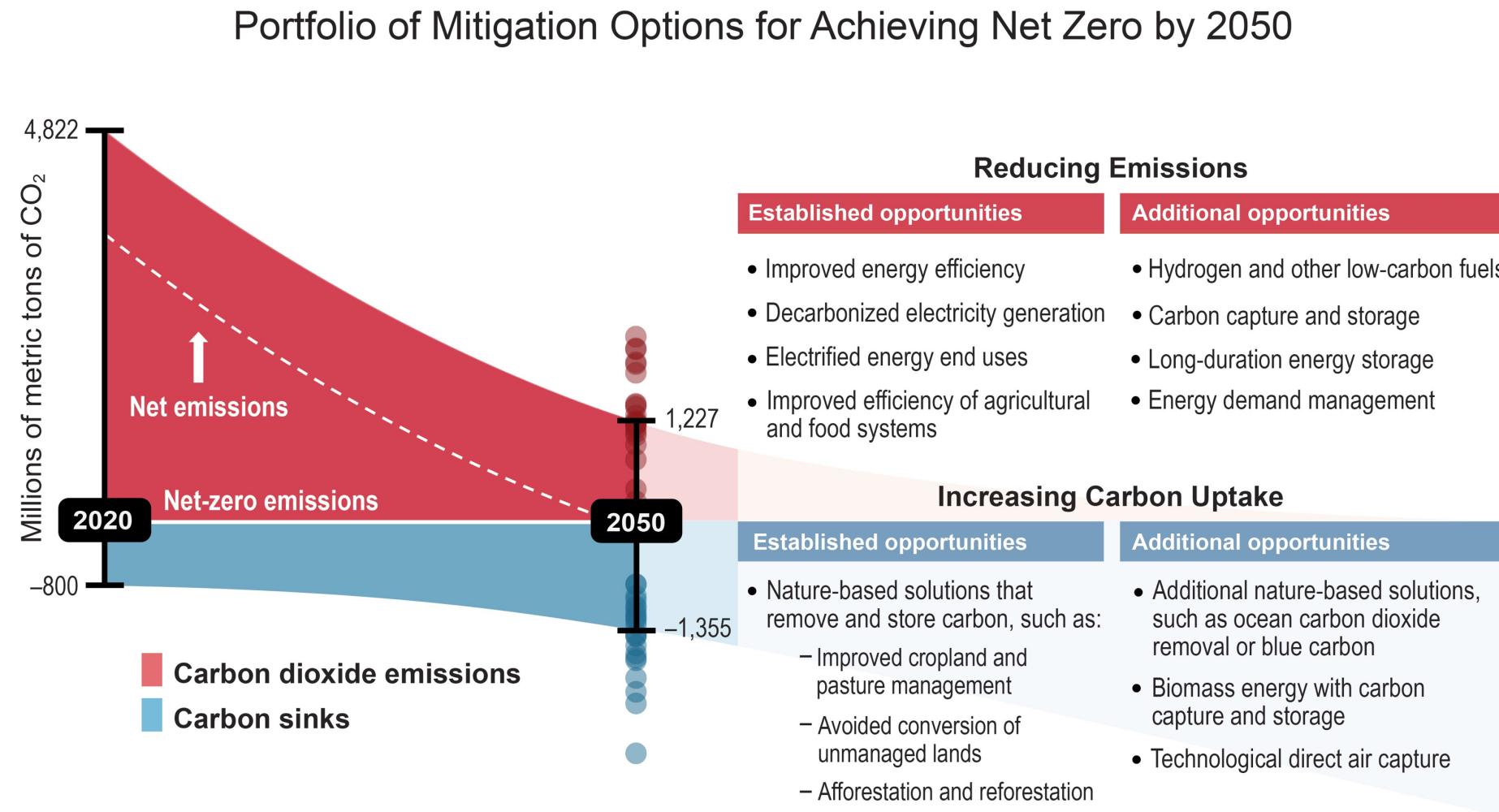
c) Annual average loss from all types of flooding, 2020



d) Projected percent change in average annual loss, 2020 to 2050



We determine our future



We determine our future



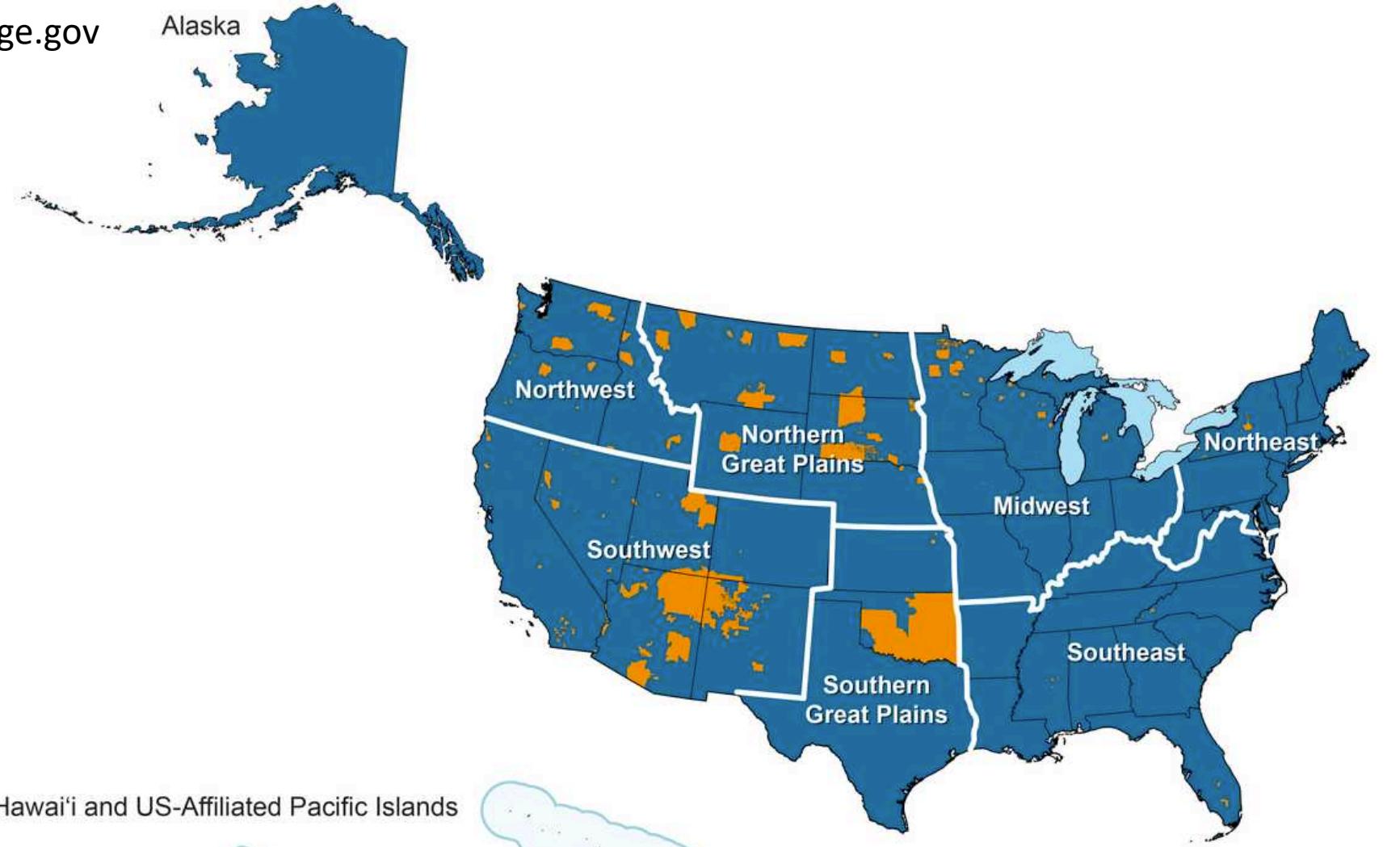
Table 1.3. Incremental Versus Transformative Adaptation Approaches

Examples of incremental adaptation	Examples of transformative adaptation
 Using air-conditioning during heatwaves	Redesigning cities and buildings to address heat
 Reducing water consumption during droughts	Shifting water-intensive industry to match projected rainfall patterns
 Elevating homes above flood waters	Directing new housing development to less flood-prone areas

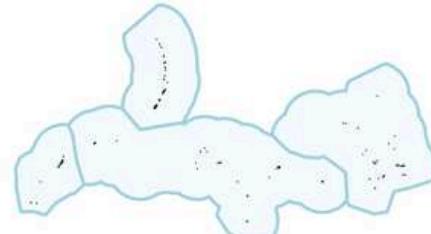
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Hawai'i and US-Affiliated Pacific Islands



US Caribbean



■ Federally Recognized Tribal Land



FIFTH NATIONAL CLIMATE ASSESSMENT

26. Southern Great Plains

[« PREVIOUS CHAPTER](#) [VIEW ALL FIGURES](#)[NEXT CHAPTER »](#)

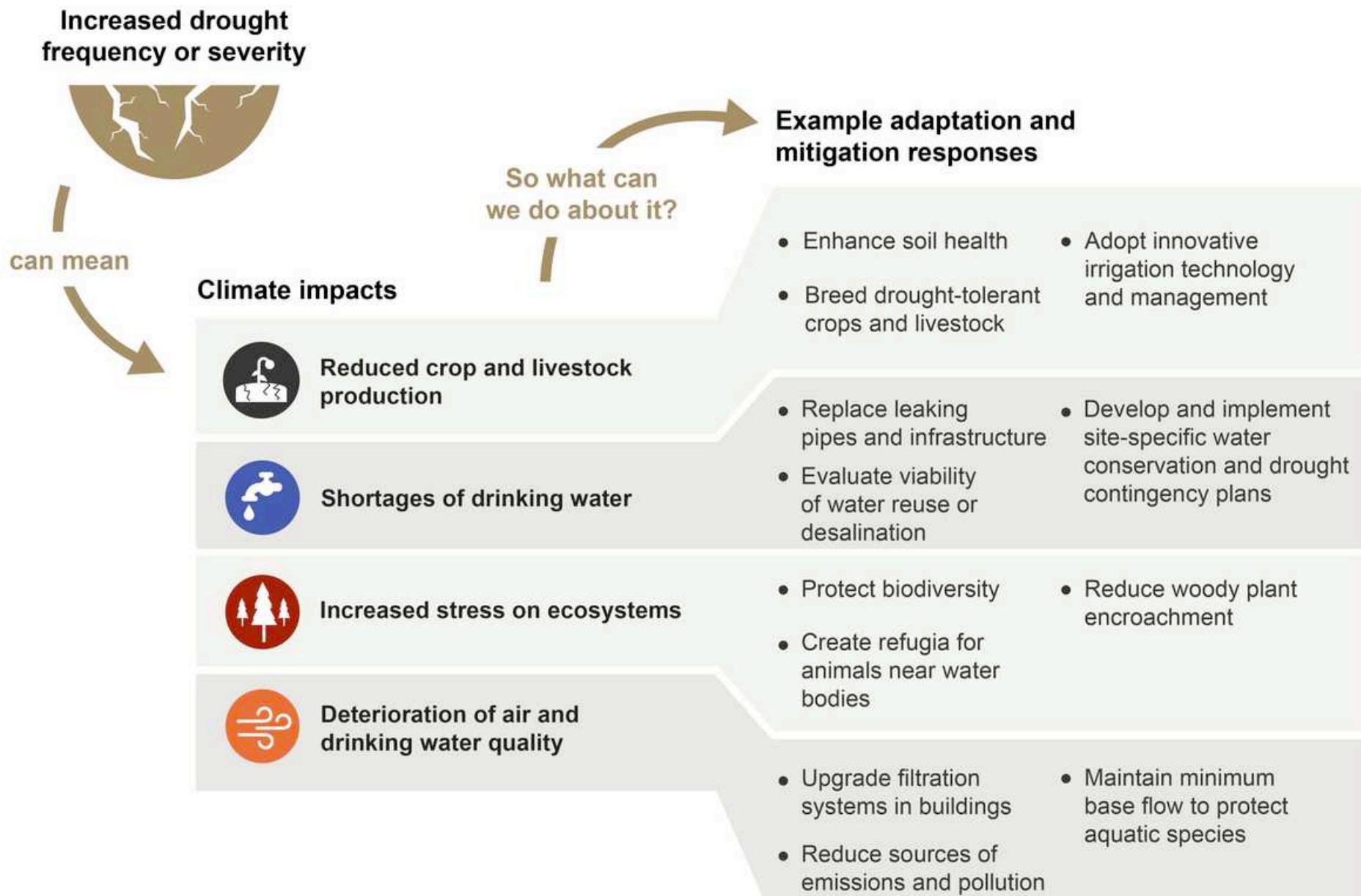
SECTIONS

Introduction

Climate change is degrading the air, lands, and waters that people in the Southern Great Plains rely on for economic, recreational, and cultural activities. These impacts compound existing burdens on those who have the fewest resources to prepare and adapt. People are adapting through nature-based solutions, reliance on Indigenous and local knowledges, and resilient infrastructure that enhances public health and the region's economy.

SGP KM1: How We Live: Climate Change Is Degrading Lands, Waters, Culture, and Health

Climate change is...putting us at **risk from climate hazards** that degrade our lands and waters, quality of life, health and well-being, and cultural interconnectedness (**high confidence**). Many climate hazards are expected to become **more frequent, intense, or prolonged**; to broaden in spatial extent; and to result in more people experiencing costly, deadly, or stressful climate-related conditions (**very likely, high confidence**). To address the growing risk, **effective climate-resilient actions** include implementing nature-based solutions; valuing Indigenous, traditional, and local knowledges; and infusing climate change solutions into community planning (**medium confidence**).

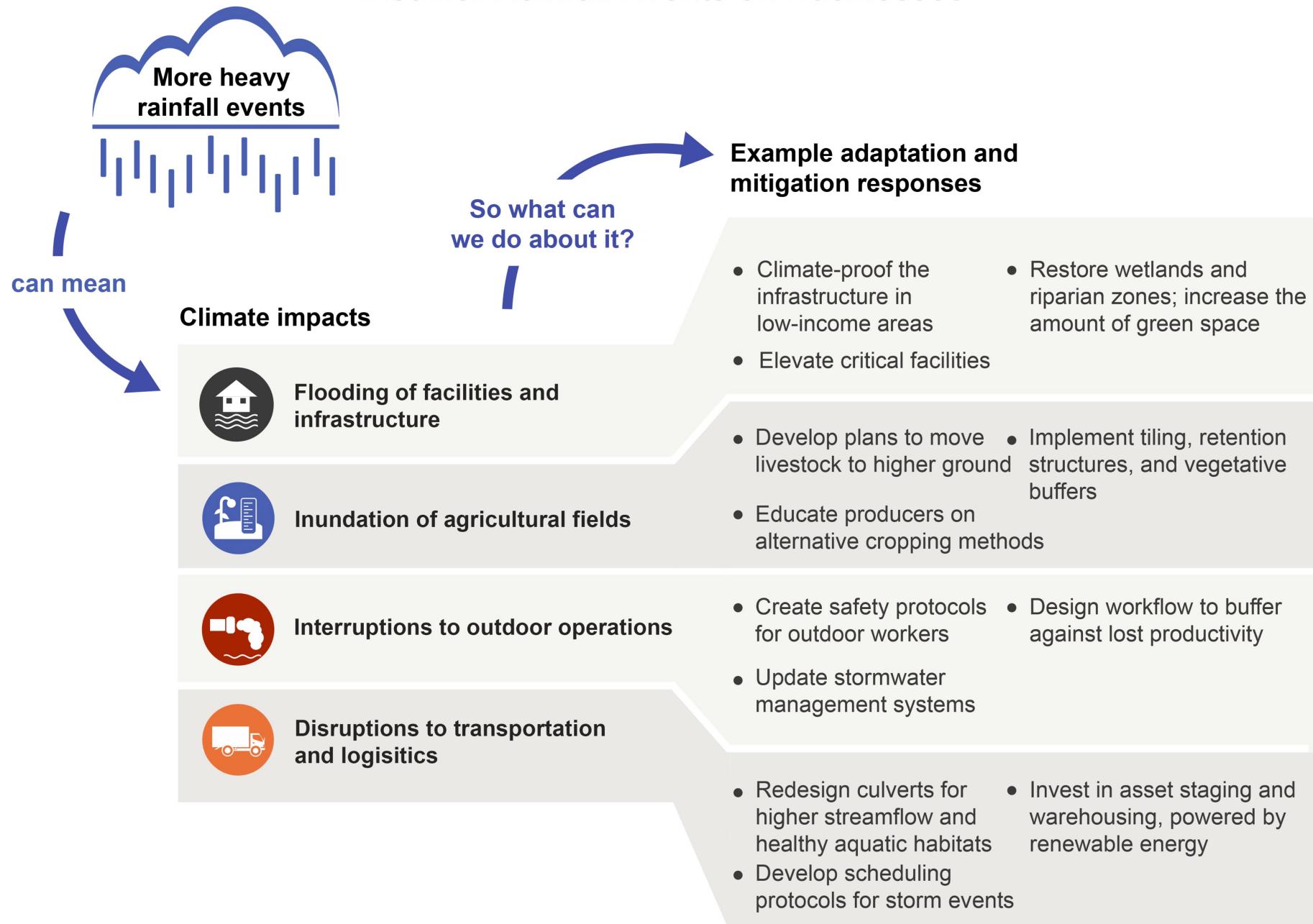


SGP KM2: How We Work: Climate Changes Are Creating Economic Challenges and Opportunities

...businesses and industries...are experiencing disruptions and losses in productivity and profits—but also new economic opportunities (high confidence). [Climate change is] expected to force widespread and costly changes in how we work (very likely, high confidence).

Businesses and industries have opportunities to...develop products and services in climate mitigation technologies, adaptation strategies, and resilient design that will enhance the region's economy (medium confidence).

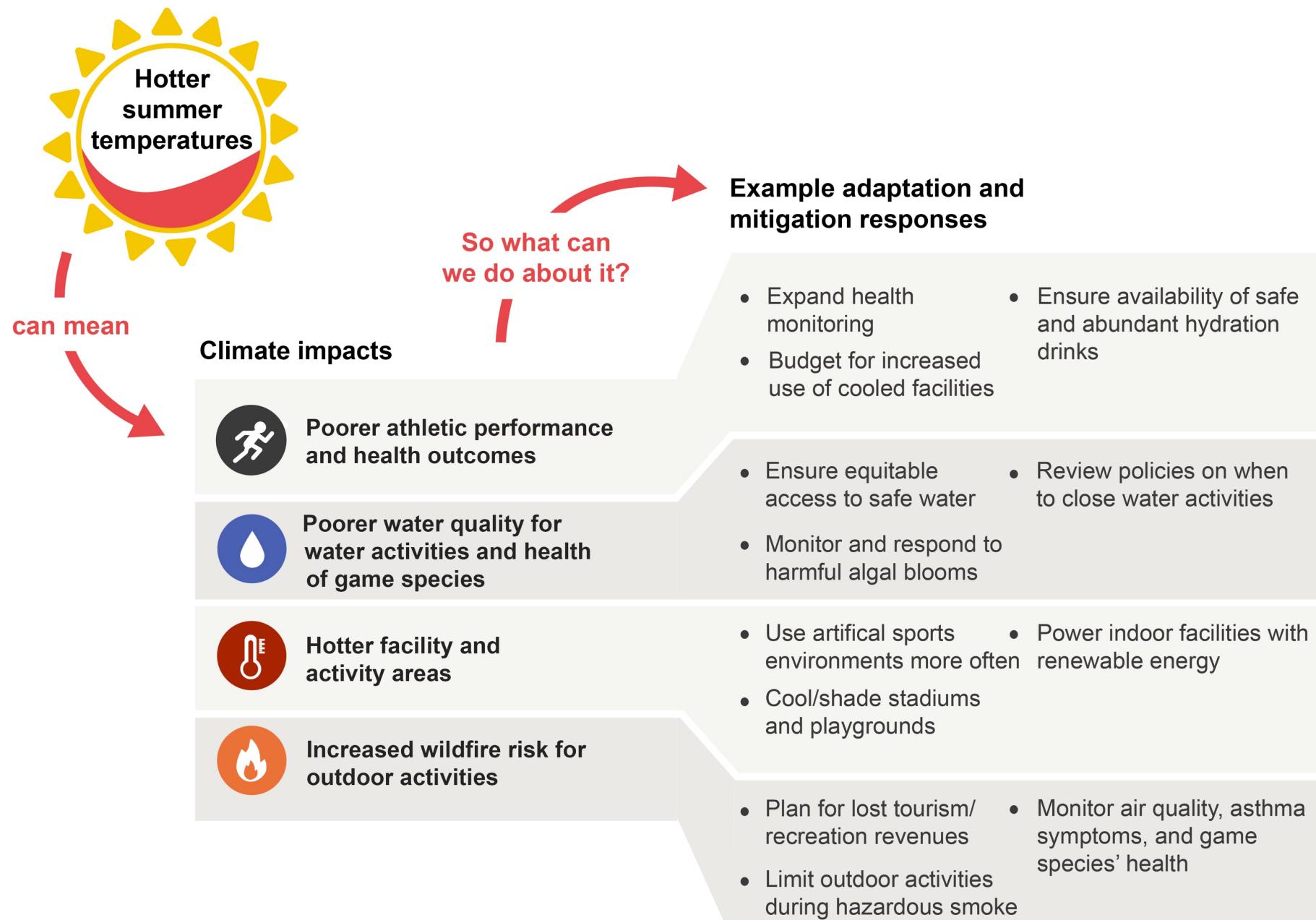
Resilience Actions to Address the Impacts of Heavier Rainfall Events on Businesses



SGP KM3: How We Play: Climate Extremes Are Endangering Sports, Recreation, and Leisure

Extreme climate-related events are negatively influencing how we play and participate in outdoor sport, recreation, and physical activities...(**very high confidence**). Climate change is expected to increase heat-related illness and death, reduce outdoor physical activity, and decrease athletic performance (**very likely, high confidence**). Individuals, communities, and sports organizations can adapt to these hazards...(**high confidence**).

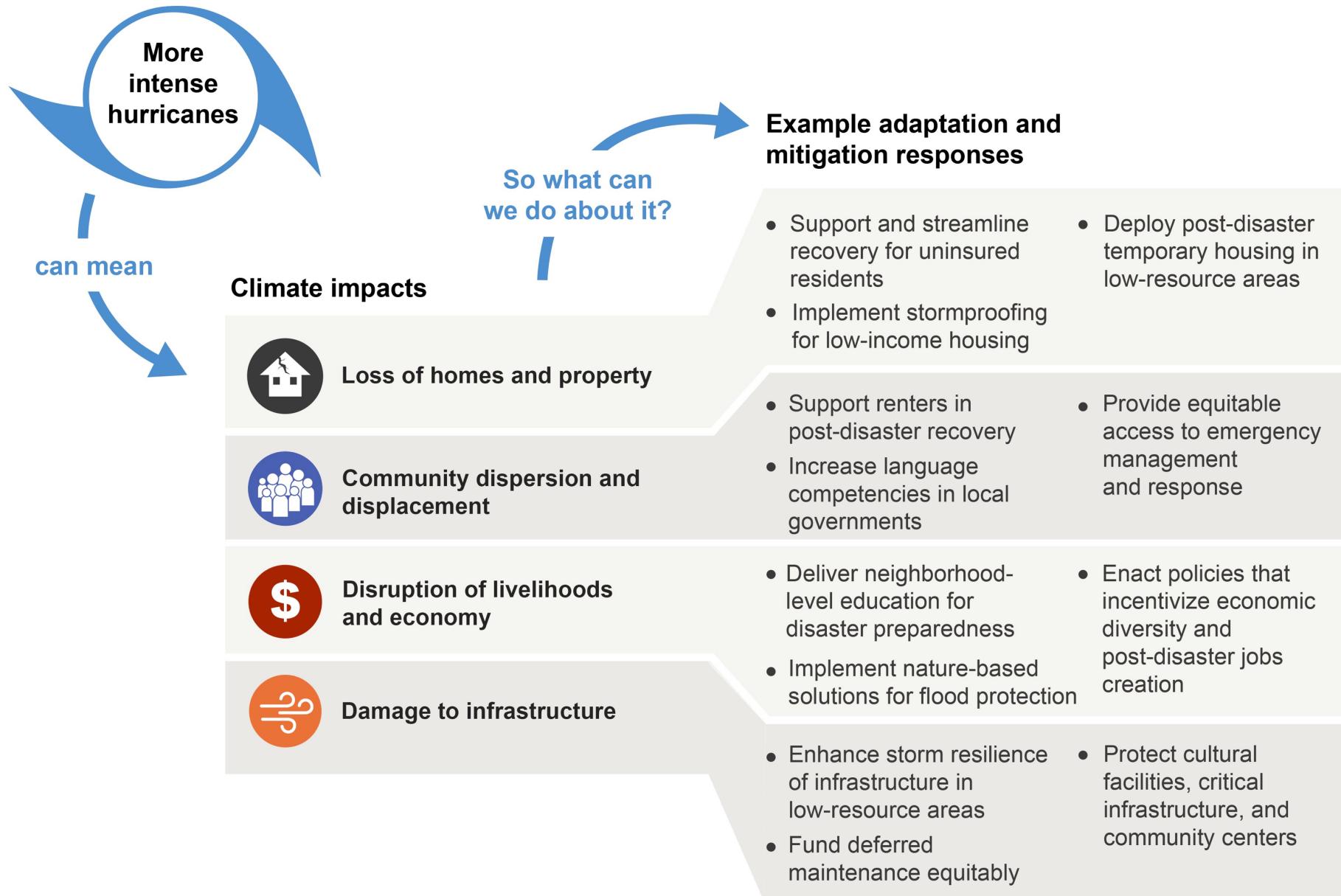
Resilience Actions to Address the Impacts of Hotter Summer Temperatures on Outdoor Activities



SGP KM4: How We Heal: Climate Change Is Exacerbating Existing Social and Environmental Disparities

Some...are suffering disproportionately from climate-related hazards because of long-standing marginalization, discrimination, and governmental policies (very high confidence)...climate change will compound existing social and environmental burdens on the people, neighborhoods, and communities with the fewest resources to prepare and adapt (very high confidence). Our institutions and governments can play a role in improving outcomes for these people and places by adopting...practices and policies that prioritize social equity and justice, aim to reduce community risks, build resilience, and repair past injustices (medium confidence).

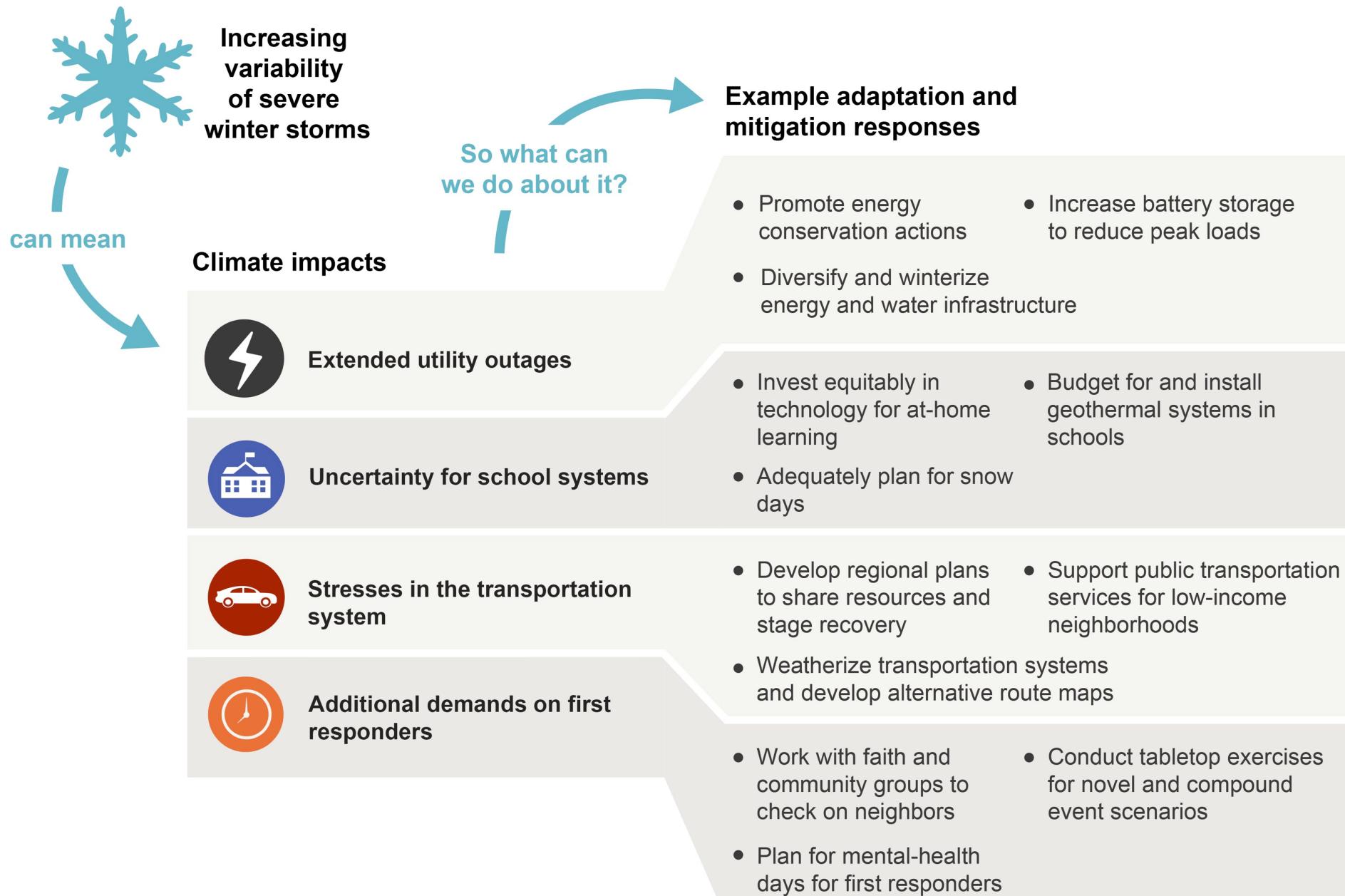
Resilience Actions to Address Equity and Justice Issues Related to Increasing Hurricane Risk



SGP KM 5: How We Serve: Climate Change Is Straining Public Infrastructure and Services

The institutions that serve our communities have been challenged to respond and adapt to more frequent and intense weather events (**medium confidence**)...climate change is expected to strain water supplies, transportation infrastructure, and emergency services...(**high confidence**). Actions that can enhance our community resilience include substantially reducing greenhouse gas emissions, installing or retrofitting climate-resilient infrastructure, educating students and the public on climate change, and cultivating the capacity of faith- and volunteer-based aid organizations to assist hazard planning, response, and recovery (**medium confidence**).

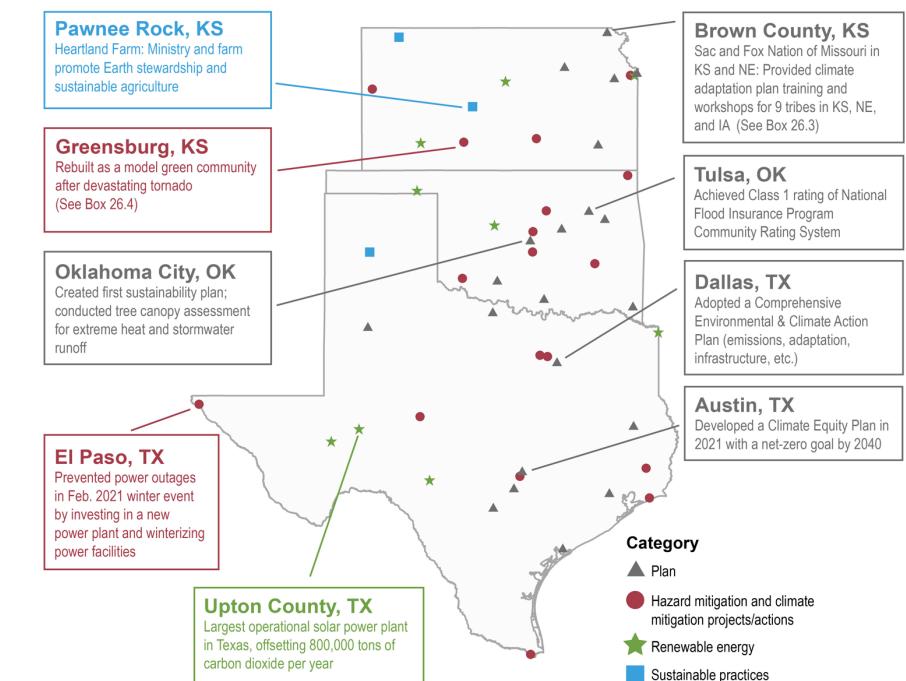
Resilience Actions to Address the Impacts of Severe Winter Storms on Public Services



Where to find NCA5

- The full report is online at nca2023.globalchange.gov
- All chapter content, including figures, is freely available
- Read and respond
- Become involved in next NCA

Mitigation and Adaptation Actions Across the Southern Great Plains



STARTLEMENT

by Ada Limón, 24th Poet Laureate Consultant in Poetry at the Library of Congress

It is a forgotten pleasure, the pleasure
of the unexpected blue-bellied lizard

skittering off his sun spot rock, the flicker
of an unknown bird by the bus stop.

To think, perhaps, we are not distinguishable
and therefore no loneliness can exist here.

Species to species in the same blue air, smoke—
wing flutter buzzing, a car horn coming.

So many unknown languages, to think we have
only honored this strange human tongue.

If you sit by the riverside, you see a culmination
of all things upstream. We know now,

we were never at the circle's center, instead
all around us something is living or trying to live.

The world says, What we are becoming, we are
becoming together.

The world says, One type of dream has ended
and another has just begun.

The world says, Once we were separate,
and now we must move in unison.



Ada Limón, 24th US Poet Laureate

Presentation available at:

www.github.com/SmithEcophysLab/seminar/2023_sbtg

Nick Smith

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