# North Central Climate Adaptation Science Center's Rapid Climate Assessment Program (RCAP)

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USGS · DEPARTMENT OF INTERIOR · S D · University of MONTANA · Great Plains · WCS · CONSERVATION SCIENCE PARTNERS · CU

Introduction

The North Central Climate Adaptation Science Center (NC CASC) launched its **Rapid Climate Assessment Program (RCAP)** in 2023 to create a mechanism to respond quickly to emerging and evolving science needs of partners, stakeholders, and rights holders. The RCAP undertakes exploratory and synthetic research to support the NC CASC mission *to deliver science to help fish, wildlife, water, land, and people adapt to a changing climate* across the North Central region, by serving natural and cultural resource managers in Colorado, Wyoming, Montana, North Dakota, South Dakota, Kansas, and Nebraska. The RCAP has since become **an integral part of the NC CASC's approach to actionable climate adaptation science**.
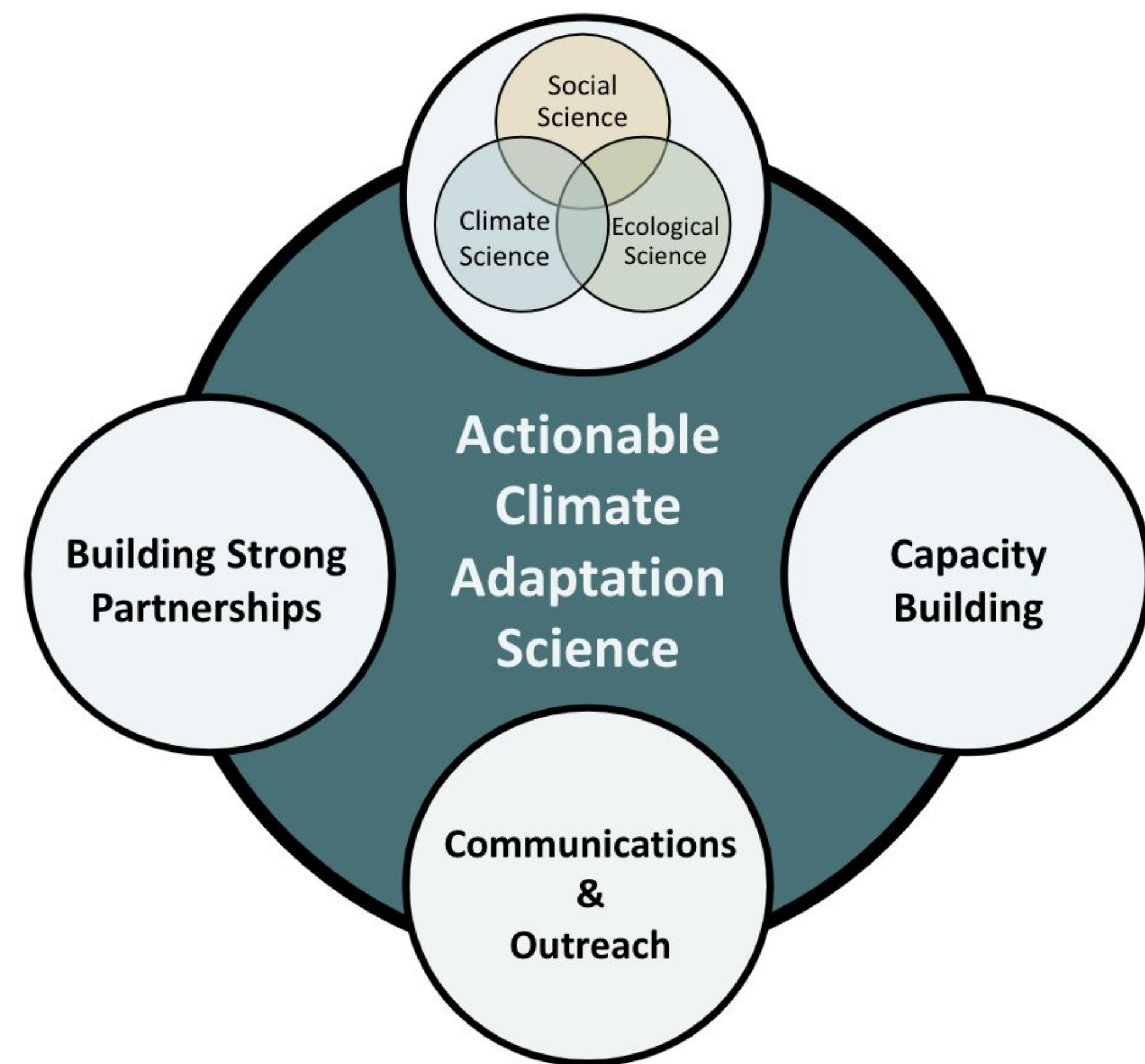
NC CASC's approach to developing and delivering actionable climate adaptation science integrates climate-ecological-social science, partnership building, capacity building, and communications & outreach.

Rapid Climate Assessments (RCAs)

➢ Aim to create **syntheses of science information**, perform **succinct analyses**, or **develop tools and datasets** that inform science and data needs, and **inform further research** and stakeholder engagement
➢ Are designed to be **three-month 'desktop' efforts**
➢ Are led by NC CASC scientists and graduate/undergraduate students **in collaboration with research teams**, including NC CASC's Consortium and USGS partners, and research collaborators
➢ Projects span ecosystems of the North Central region (mountains, grasslands, sagebrush), and sciences (climate, ecological and social)

Selected Projects

Climate Change Impacts on Introduced Cool-Season (C3) Grasses in the Prairie Pothole Region, USA

Introduced Cool-Season (C3) Grasses in the Prairie Pothole Region

Smooth bromegrass and Kentucky blue-grass make up more than half of the plant cover in native prairies on refuge lands.

Drivers of Invasion
Intentional planting
Warm, wet conditions
Nitrogen enrichment
Altered disturbance regimes (fire, grazing)

Kentucky Bluegrass (*Poa pratensis*)
Image: Chris Helzer, TNC

Smooth Bromegrass (*Bromus inermis*)
Image: Cami Dixon, USFWS

Sod-forming
Can change soil hydrology
Creates a large seed bank

Deep-rooted
Limits light for native plants
Changes nutrient availability

Both cool-season (C3) perennials
Reproduce by seed and rhizomes
Outcompete native species

Sam Ahler (GRA), Kyra Clark-Wolf (NC CASC Co-Lead), Imtiaz Rangwala (NC CASC Co-Lead), Cami Dixon (US FWS), and Chelsea Nagy (NC RISCC)

Climate Adaptation in the North Central Mountains: Alpine Tundra and Treeline

Current Trends for the North Central Region

Climate: warmer spring and winter temperatures; higher fall streamflows indicates glacial and permafrost melt.

Wildlife: earlier arrival and emergence of migrating and hibernating species; decline in snowpack affect denning and habitat connectivity; local extirpations at warm, dry range margins.

Lakes: ice thickness is thinning and ice-off dates are occurring earlier in the year; phytoplankton community composition is changing.

Vegetation: loss of species at their warm, dry range margins, but slow responses due to large biological lags in the dispersal, establishment, and extinction of alpine plants.

Treeline: upslope movement of treeline is spatially variable, largely driven by densification, and slower than rate of climate warming.

Photo Credit: Viviana Riche, Unsplash

Aly Ennis (GRA), Meagan Oldfather (USGS Co-Lead), Imtiaz Rangwala (NC CASC Co-Lead), Kyra Clark-Wolf (NC CASC Co-Lead)

Examination of Large-Scale Drivers of Water Availability in the US Great Plains

Methodology - Clustering

Temperature & Precipitation (1991-2020)
40.9361N to 48.8953N, 108.7500W to 92.1002W (Annual Precipitation: 21.8 inches)
climatetoolbox.org

Precipitation — Max Temperature — Min Temperature

Seasonal Rainfall (May-Sep) (1951-2019)
Seasonal Rainfall (Pre Dec-Feb) (1951-2019)

Precipitation regime in the Northern Great Plains (**NGP**), showing summer months (June to August) tending to be the wettest period. Conversely, winter months (December to February) in the region are typically drier.
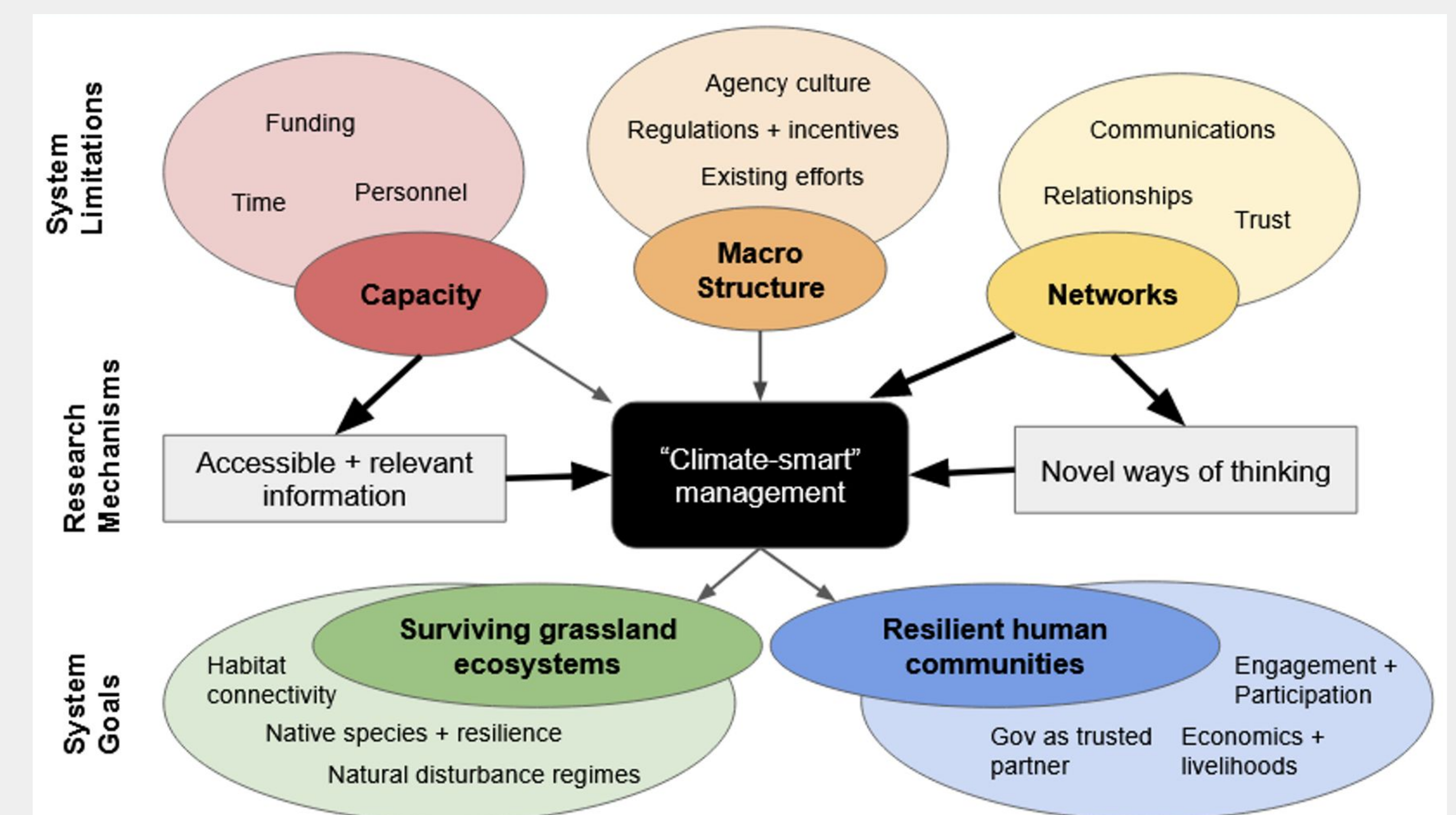
● In our study, we identify May-Sep as the warm season and Dec-Feb as the cold season.

Prasad Thota (GRA), Imtiaz Rangwala (NC CASC Lead)

Supporting Grassland Managers to Conserve Grassland Ecosystems and Adapt to Climate Change in the North Central Region

System Limitations
Funding · Time · Personnel
Capacity

Agency culture
Regulations + incentives
Existing efforts
Macro Structure

Communications · Relationships · Trust
Networks

Research Mechanisms
Accessible + relevant information
"Climate-smart" management
Novel ways of thinking

System Goals
Surviving grassland ecosystems
Habitat connectivity
Native species + resilience
Natural disturbance regimes

Resilient human communities
Engagement + Participation
Gov as trusted partner
Economics + livelihoods

Elizabeth Woolner (GRA), Heather Yocum (NC CASC Co-Lead), Christy Miller Hesed (NC CASC Co-Lead)

Learn more about RCAPs and our work at the NC CASC!