

Vulnerability & Adaptation in the Gunnison Basin, Colorado: Pilot Project

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North Central Climate Science Center Adaptation
Working Group

1. Gunnison Basin pilot project
2. Approach/tools
3. Best practices & lessons learned
4. Challenges & next steps





Southwest
Climate Change Initiative

Provide info & tools to managers to
develop/implement adaptation strategies

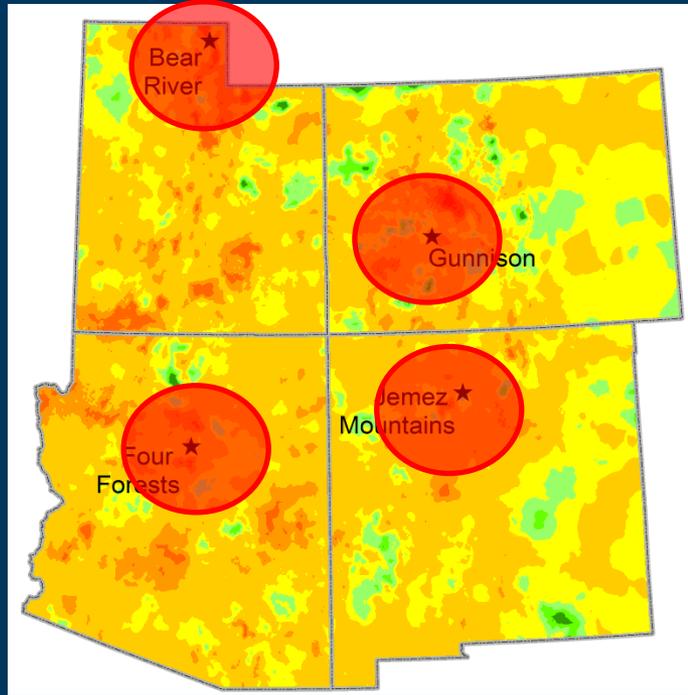


WESTERN WATER ASSESSMENT A decorative banner at the bottom of the slide with the text "WESTERN WATER ASSESSMENT" and a series of small icons representing water cycle elements like a snowflake, a sun, a cloud, a drop, and a person.



Southwest
Climate Change Initiative

Pilot Adaptation Landscapes



Why the Gunnison Basin?

1. High climate exposure
2. Species of concern & ecosystems
3. Build on research
4. Partnerships & conservation



Primary Questions

- What species & ecosystems are at risk & why?
- How will land-based livelihoods be impacted? How will they respond?
- What strategies will help species, ecosystems and people adapt?

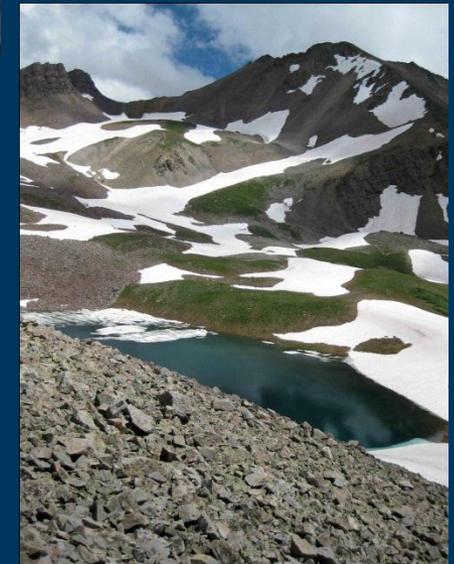
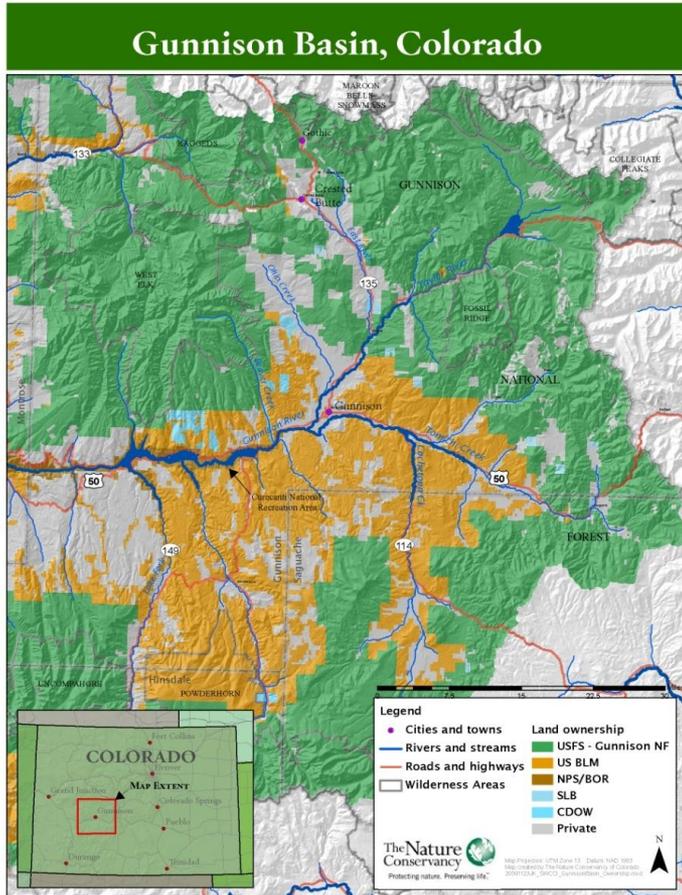


Approach

1. Adaptation workshop
2. Ecological & social vulnerability assessments
3. On-the-ground adaptation project
4. Basin-wide adaptation strategies to build social-resilience



2009 Gunnison Basin Climate Adaptation Workshop for Natural Resource Managers



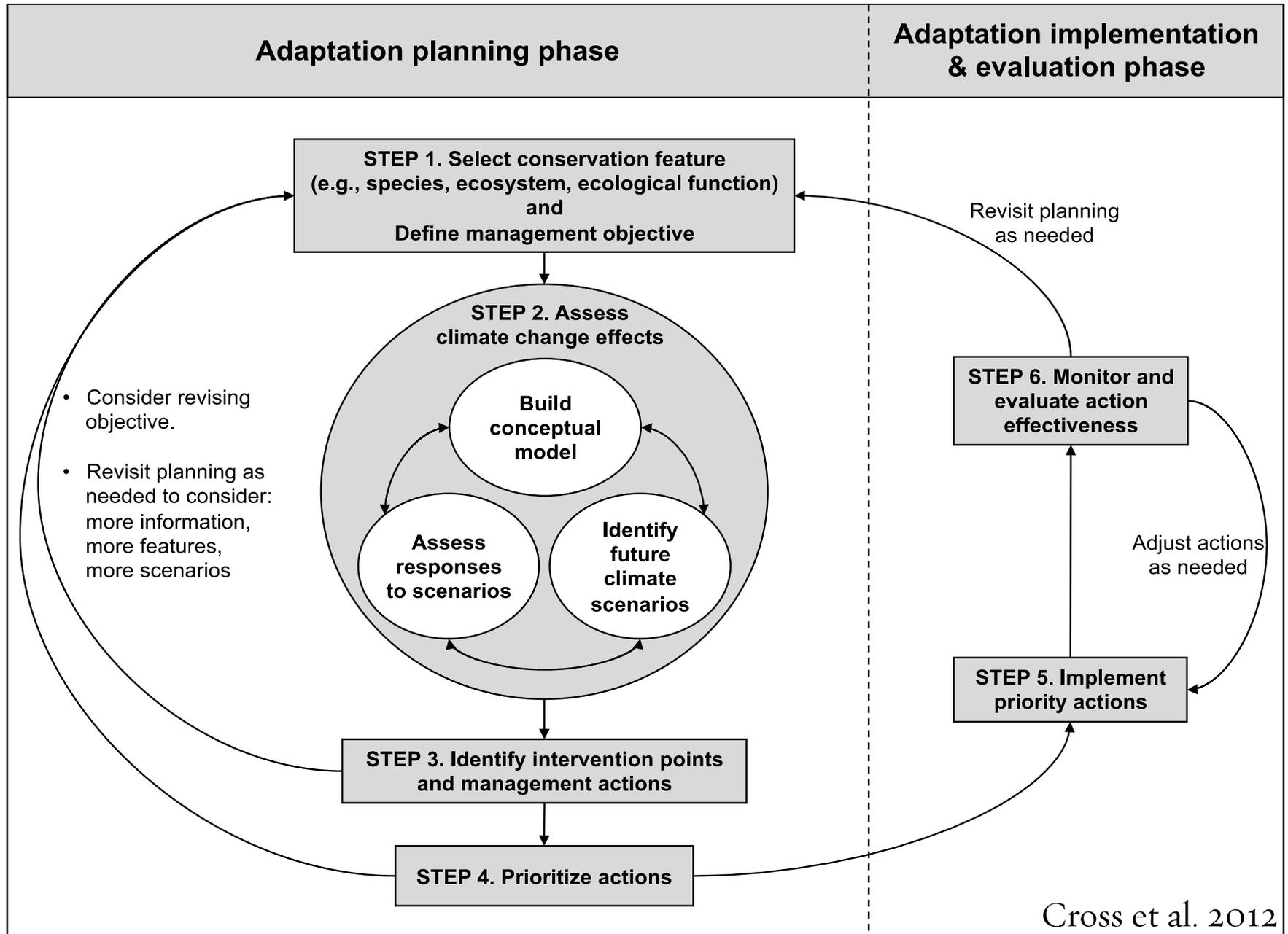
Workshop Goals & Objectives

Identify strategies to help species & ecosystems adapt & lay groundwork for implementation

1. Apply ACT Framework
2. Assess impacts
3. Identify strategies
4. Identify opportunities for collaboration & implementation



Adaptation for Conservation Targets (ACT) Framework



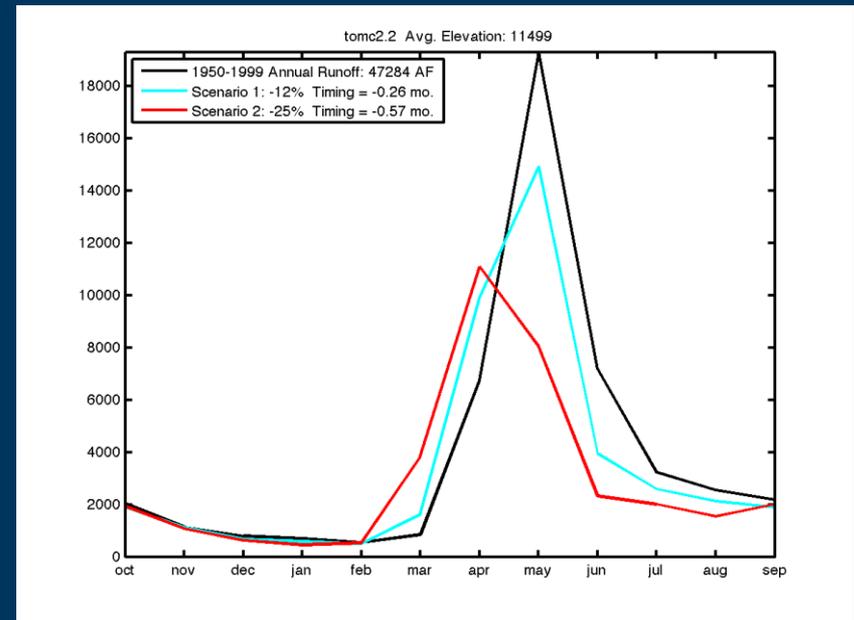
Climate Scenarios (2040-2060)

Moderate:

- Increased T: 4.5 °F
- No major change in P
- Streamflow decrease 5-10%

More extreme:

- Increased T: 5.4 °F
- Decreased P by 10%
- Streamflow decrease 20-25%



Dr. Linda Mearns, NCAR

Dr. Joe Barsugli, CU, Western Water Assessment

Gunnison Sage-grouse

Projected Impact

Fewer mesic & lower quality brood rearing sites

Strategic Action

Retain water in most vulnerable brood rearing habitats (meadows, seeps & springs)



Gunnison Climate Working Group Goals

1. Increase understanding & awareness of threats to nature & people
2. Identify & prioritize strategies & techniques
3. Promote coordinated & effective action

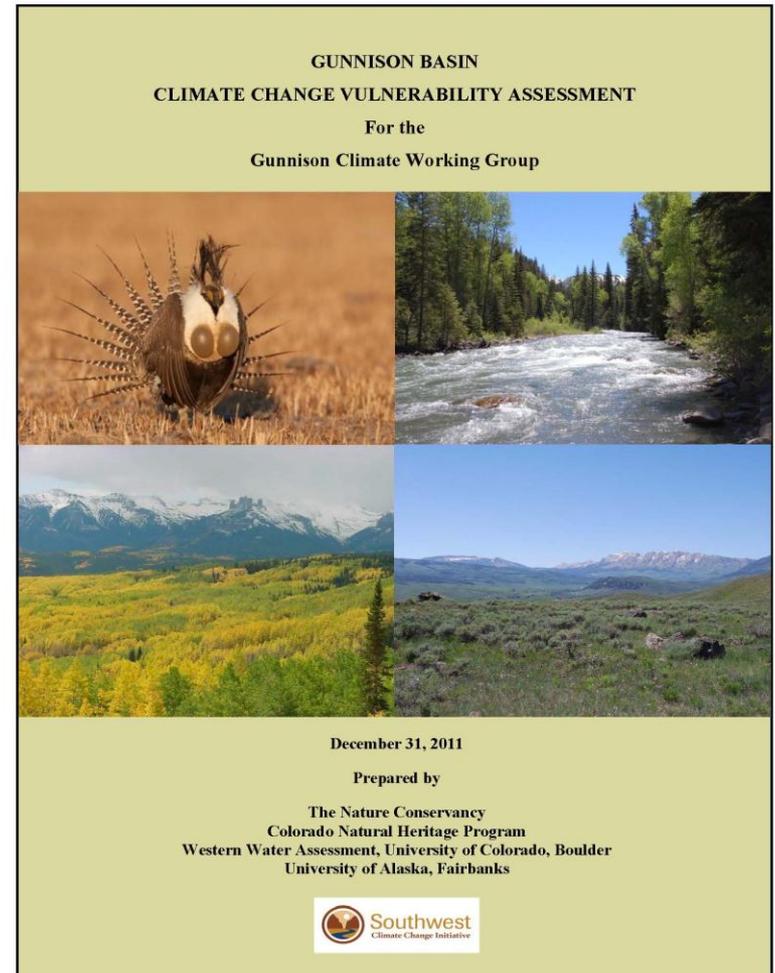


Gunnison Climate Working Group

1. Bureau of Land Management
2. Colorado Natural Heritage Program
3. Colorado Parks & Wildlife
4. Gunnison County
5. Gunnison County Stockgrowers Association
6. Lake Fork Valley Conservancy
7. National Center for Atmospheric Research
8. National Park Service
9. Natural Resources Conservation Service
10. Rocky Mtn. Biological Lab
11. The Nature Conservancy
12. Trout Unlimited
13. University of Colorado/Western Water Assessment
14. Upper Gunnison River Water Conservancy District
15. US Fish & Wildlife Service
16. US Forest Service & RMRS
17. Western State Colorado University



- What species & ecosystems are at risk?
- How vulnerable are they & what attributes make them vulnerable?
- Set priorities for developing strategies



24 Ecosystems

- Manomet Center for Conservation Science

70 Species

- NatureServe Climate Change Vulnerability Index

Literature review &
workshops

Ecosystem	Vulnerability Rating
Small high-elevation streams	Low to Moderately Vulnerable
Mid-size streams	Moderate to Highly Vulnerable
Rivers	Moderate to Highly Vulnerable
High-elevation, groundwater-dependent wetlands	Low to Moderately Vulnerable
Montane groundwater-dependent wetlands	Highly Vulnerable
High-elevation lakes	Low to Moderately Vulnerable
Reservoirs and associated wetlands	Moderately Vulnerable

1. How will key livelihoods be impacted & how they might respond?
2. What might people do to increase resilience?

Connected to the Land:

Social Resilience and Vulnerability Assessment of Land-Based Livelihoods in the Gunnison Basin, Colorado



Report for the Nature Conservancy and
The Gunnison Climate Working Group

Corrine Noel Knapp
PhD Student at the University of Alaska, Fairbanks
November 28, 2011

Semi-Structured Interviews (N=35)

- Ranching
- Recreation
- Stressors, adaptations...

Analysis

- Recorded and transcribed
- Qualitative data analysis
- Track patterns



Current Weather Impacts

“Probably the biggest is the drought: severe drought. I have seen it a couple times in my life. Where there was almost no snowpack and then the ensuing summer there was no stock water, no grass, all those things and then no hay to go through the next winter.”

Gunnison Basin Rancher

Table 4. Percentage of Gunnison Basin participants who talked about these weather impacts to land-based livelihoods.

	Ranchers n=19	Recreation n=16
Drought	>100%	60%
Inadequate snowpack	73%	80%
Extreme cold		
Timing of runoff		
Lack of spring moisture (stockwater, spring range, wildflowers)		
Extreme snowfall		
Dust on snow		
Cold during calving		
Thunderstorms		
Too wet/rainy		
Early fall snowstorms		
Weather in other places		



Resilience

- High social capital
- Local knowledge
- Ability to innovate

Vulnerability

- Dependence on federal lands
- Tension w/ broader community
- Multiple & interacting stressors



Integrating social aspects can help:

- Understand context for conservation
- Identify feedbacks between social & ecological systems
- Identify conflicts & opportunities



On-the-ground adaptation project

Build resilience of brood-rearing habitat to help Gunnison Sage-grouse & other wildlife species adapt to climate change



Gunnison Project Challenges

1. Finding an integrated framework that incorporates human well-being into ecological adaptation planning
2. Obtaining broader support, e.g., political leaders, community, to prepare for change



Next Steps

1. Complete on-the-ground adaptation project & monitor
2. Formalize working group
3. Basin-wide strategies to build social-ecological resilience



Collaborative Proposal

- Facilitate adaptation that contributes to social-ecological resilience, conservation, & sustainable communities
- Develop & pilot an integrated adaptation planning framework that merges:
 - Iterative scenario process
 - ACT framework

What have we learned?

- Local perspectives critical
- Integrate social & ecological systems early on
- On-the-ground projects increase understanding & support
- Have many tools but need to broaden scope &/or increase pace



Special thanks!

Gunnison Climate Working Group & Collaborators

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