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

Betsy Neely, The Nature Conservancy
North Central Climate Science Center Adaptation Working Group

April 3, 2013
National Adaptation Forum
Outline

1. Gunnison Basin pilot project

2. Approach/tools

3. Best practices & lessons learned

4. Challenges & next steps
Provide info & tools to managers to develop/implement adaptation strategies
Pilot Adaptation Landscapes
Why the Gunnison Basin?

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

• 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?
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
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

**Adaptation planning phase**

1. **STEP 1.** Select conservation feature (e.g., species, ecosystem, ecological function) and Define management objective

2. **STEP 2.** Assess climate change effects
   - Build conceptual model
   - Assess responses to scenarios
   - Identify future climate scenarios

3. **STEP 3.** Identify intervention points and management actions

4. **STEP 4.** Prioritize actions

**Adaptation implementation & evaluation phase**

5. **STEP 5.** Implement priority actions

6. **STEP 6.** Monitor and evaluate action effectiveness

- Revisit planning as needed
- Adjust actions as needed

- Consider revising objective.
- Revisit planning as needed to consider: more information, more features, more scenarios

Cross et al. 2012
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

<table>
<thead>
<tr>
<th>Projected Impact</th>
<th>Strategic Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer mesic &amp; lower quality brood rearing sites</td>
<td>Retain water in most vulnerable brood rearing habitats (meadows, seeps &amp; springs)</td>
</tr>
</tbody>
</table>
Gunnison Climate Working Group Goals

1. Increase understanding & awareness of threats to nature & people

2. Identify & prioritize strategies & techniques

3. Promote coordinated & effective action
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

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

Literature review & workshops
1. How will key livelihoods be impacted & how they might respond?

2. What might people do to increase resilience?
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>
<thead>
<tr>
<th>Weather Impact</th>
<th>Ranchers n=19</th>
<th>Recreation n=16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>&gt;100%</td>
<td>60%</td>
</tr>
<tr>
<td>Inadequate snowpack</td>
<td>73%</td>
<td>80%</td>
</tr>
<tr>
<td>Extreme cold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing of runoff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of spring moisture (stockwater, spring range, wildflowers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extreme snowfall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust on snow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold during calving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thunderstorms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Too wet/rainy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early fall snowstorms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weather in other places</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Knapp 2011
Ranching: Resilience & Vulnerability

**Resilience**
- High social capital
- Local knowledge
- Ability to innovate

**Vulnerability**
- Dependence on federal lands
- Tension with broader community
- Multiple & interacting stressors

Knapp 2011
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
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

Brian St. George, Andrew Breibart, Gay Austin, BLM
Nathan Seward, Amy Seglund, Paul Jones, CPW
Jim Cochran, Gunnison County
Renee Rondeau, CNHP
Camille Richard, LFVC
Ken Stahlnecker, NPS
Christina Santana, Liz With, Chris Bove, NRCS
Ian Billick, RMBL
John Murphy, Mark Hatcher, Carol Howe, Matt Vasquez, USFS
Pat Magee, Jonathan Coop, WSCU
Jamie Robertson, Chris Pague, John Sanderson, TNC
Advisors: Bill Travis, CU, Linda Joyce, USFS, Joel Smith, Stratus
Corrie Knapp: UAF
Frank Kugel, UGRWCD
Joseph Barsugli, Western Water Assessment
Molly Cross, Gregg Garfin, Patrick McCarthy, SWCCI
Special Thanks to our Funders