Project Completion Report
Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU)

Project Title: Identifying Multi-jurisdictional Adaptation Strategies for Responding to Climate Change on Federal Lands

Project Code: H1200040001 CSURM-102

Type of Project (Research, Technical Assistance or Education): Research

Funding Agency: National Park Service, Natural Resource Stewardship and Science

Partner University: Colorado State University

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Start Date of Project: September 1, 2007

End Date of Project: December 30, 2011

Funding Amount: $55,000

Project Summary:
Six hundred fifty million acres of the U.S. (nearly 30%) are federally owned and managed public lands. Many of these lands represent some of our nation's most unique and pristine natural and cultural treasures. As the threats from global climate change increase, federal lands managers face unprecedented challenges for protecting and preserving this heritage and communicating the impacts to the public. Many of these threats transcend jurisdictional boundaries (e.g., fragmentation /connectivity, invasive species, range shifts/migrations, altered hydrologic and disturbance regimes, etc.). To meet the challenge of climate change an organizational evolution is necessary that fosters landscape scale coordination among agencies and promotes conservation plans to facilitate biome shifts, species migration, and other transboundary issues

This project consisted of two “pilot” strategic planning programs/workshops to empower federal land managers with the skills, tools and resources necessary to become more proactive, adaptive, and collaborative in finding solutions for coping with climate change issues. The pilot projects were designed and implemented in coordination with the multi-agency CESU Network.

Each pilot focused within one of five “critical systems” (high latitudes, high altitudes, complex coastal, drylands, and prairie grasslands) that have been identified by the scientific community as requiring special focus for research and management related to climate change.

The pilots included pre and post consultation designed around multiple stakeholder workshops that: 1) introduced some of the scientific findings related to climate changes impact on federal lands; 2) developed multi-jurisdictional climate change adaptation, planning, and communication strategies, including assessment and monitoring tools; 3) provided an opportunity for brainstorming, discussion, and follow up regarding implementation of such strategies; and 4) documented the multi-stakeholder engagement process and outcomes for use in other regions.

The workshops were two days in length and were hosted at a government facility. Pre and post consultation activities included site visits as well as remote interaction and follow up. Workshop activities included a panel of interdisciplinary experts that presented material relevant to the natural and social dynamics of the resources issues at hand (e.g. fire management, habitat fragmentation and loss, species migration and range shifts, sea level rise, altered hydrologic regimes, etc). Poster presentations were also available to display success stories from local and regional mitigation and adaptation efforts (e.g. Climate Friendly Parks, scenario planning, etc.). The workshops incorporated communication capacity training to help the participants deal with organizational learning and change. Such topics included: systems thinking training, learning to deal with complexity and uncertainty, decision-making tools, adaptive management principles, strategies for scenario planning, “safe-to-fail” strategies, tips for communicating with scientists, managers, and the public. The ultimate goal of the workshop series was to empower managers to develop, implement, and sustain climate change adaptation strategies that incorporate transboundary issues and include multi-agency collaboration and planning. The approach met this goal by providing a multidisciplinary lens that links science and communication training, with follow up support, which is tailored to the specific management needs of a particular multi-jurisdictional landscape.

The first workshop, Border Crossing: Preparing for and Adapting to Climate Change Effects in Northern Colorado, was held November 16-17, 2010 in Estes Park, Colorado. More than 50 participants attended, representing Rocky Mountain National Park, Arapaho and Roosevelt National Forest, Pawnee National Grassland, Routt and Medicine Bow National Forest and Thunder Basin Grassland, Colorado Department of Wildlife, the City of Estes Park, Bureau of Land Management, National Park Service Climate Change Response Program, USGS, Rocky Mountain Research Station, Pacific Northwest Research Station, and Colorado State University.

The objectives of the workshop were to: (1) Increase awareness of the extent of observed and projected climate change impacts in northern Colorado; (2) Provide the opportunity for practitioners to gain experience with climate change adaptation and to consider a range of adaptation options available for resource management; (3) Increase and reinforce relevance (trust and willingness) to work across jurisdictional boundaries; (4) Begin to develop a shared vision and set of common approaches for managing shared resources that will help build resilience to climate change.

The workshop involved presentations on climate change, natural resource management under climate change, agency tools for climate change adaptation planning, and a multi-agency adaptation case study on the Olympic Peninsula in Washington. The workshop included several facilitated breakout sessions, charging participants to identify what climate change effects related to (1) wildlife, (2) water, (3) vegetation, and (4) human dimensions issues cross the boundaries they manage. During breakout discussions, participants also identified what adaptation options might be feasible and identified top priorities most ready for collaboration across neighboring lands (see Table 1).

Table 1. Top Priorities for Multi-agency Collaboration on Climate Change Adaptation in Northern Colorado

Wildlife

1. Identify Climate Vulnerable Species and Prioritize Appropriate Actions

   Caveats & Clarification: The Landscape Conservation Cooperatives (LCCs) may be able to provide a focal point for determining multiagency priorities. The group suggested using the CDOW state wildlife action plan, which includes a vulnerable species list, as a starting point; then combine that list with a list of species with greatest potential for persistence.

2. Identify Vulnerable Corridors and Prioritize Appropriate Actions

   Caveats & Clarification: The group had an extensive discussion of the corridors concept and its use – is it practical, possible, and/or necessary in building resiliency? Will be related to the list of climate vulnerable species.

3. Restore Habitat for Cutthroat Trout

4. Strengthen Adaptation Collaboration and Planning for Limber Pine Habitat

Water

5. Adopt Landscape and Long-Range Planning for Aquatic Ecosystems through Collaborative Aquatic Ecosystem Sensitivity Assessments and Vulnerability Analyses.

   Caveats & Clarification: A potential project would be to extend NRCA (National Resource Conditions Assessment) outside the boundaries of the ROMO boundaries and link with assessment processes used by: USFS, CSU, USGS, USGS, Fish and Wildlife, DOW, NCWCD Northern Colorado Water Conservancy, Big Thompson Watershed Forum

6. Expedite Watershed Restoration through Vegetation and Road Management Analyses.

   Caveats & Clarification: Collaborative efforts should focus on (1) erosion and sedimentation, (2) invasive species and (3) riparian/wetland restoration, and (4) mapping the connectivity of landscapes and disturbed areas. Key collaborators would include representatives from: USFS, NPS, USGS, DOW, local watershed groups, county governments, and town engineers.

7. Re-evaluate Structures and Development in Floodplains Leading to Floodplain Assessments

   Caveats & Clarification: Floodplain mapping should include an inventory of stream-side infrastructure and cultural resources. Floodplain assessments should include risk assessments, including: (1) emergency management response, (2) information about change in major flood intervals, and (3) Safety assessment of existing structures. Collaborating partners would include representatives from: USFS, NPS, USGS, FEMA, and local municipalities.

Vegetation

8. Increase Resilience by Diversifying the Species on the Landscape.

   Caveats & Clarification: Need more specific locations; more species can lead to a better chance of resiliency. Diversifying rangeland species could increase resiliency to climate change and invasive species.

9. Conduct Multi-agency Vulnerability Assessments; Use Scenario Planning and Adaptation Planning in Multi-agency Contexts

10. Use Fire as a Management Tool to Build Climate Change Resiliency

    Caveats & Clarification: Use prescribed burns as an offset for wildfire smoke emission

People

11. Develop a Coordinated and Consistent Suite of Messages Across Agencies – For Internal and External Audiences

    Caveats & Clarification: For internal audiences, use multiple media-types (e.g. PowerPoint, primers, presentations) and gatherings (Family Meetings, introductory training sessions) to downscale national and regional strategies and action plans to Northern Colorado. The goal of the internal effort is to align scientific understanding and management prioritization in response to climate change across departments, agencies and units. This effort may begin by giving staff permission to talk about climate change, since some employees were steered away from such dialogue for so long.

    For external messaging, use existing evidence of change on the landscape to communicate climate impacts, in combination with broad cross-agency messages. Engage and facilitate a dialogue with audiences about the observed changes and the questions the agency's scientists and managers are asking. Use climate change as an opportunity to communicate with both local and visitor audiences. Make the messages personal, by connecting to the audiences' attitudes, beliefs and values. Start by understanding your audiences and finding out what they already know and believe about climate change. Then incorporate climate change topics into popular themes by making the message subtle and connected to everyday values and activities.

12. Incorporate Place-based Climate Change Education Into Interpretation and Public Communication Messages

13. Incorporate Human Health Concerns into the Context of Climate Change Messages

14. Build and Engage in Collaborative Governance Structures Across Agencies

    Caveats & Clarification: The Olympic Peninsula Case Study is an example of a collaborative governance process that linked multiple land management agencies in adaptation planning. Assess current policy changes; start by asking: are we including climate change? If not, make sure that it is included.

The second workshop, Adaptation Planning for Grasslands and Forests in the Black Hills and Plains was held April 20-21, 2011 in Rapid City, South Dakota. More than 90 participants attended, representing numerous federal agencies including USFS-Rocky Mountain Research Station, Black Hills National Forest, Nebraska National Forests and Grasslands, Buffalo Gap National Grassland, Fort Pierre National Grassland, NPS-Northern Great Plains I&M Network, Wind Cave National Park, Mount Rushmore National Memorial, Jewel Cave National Monument, Badlands National Park, Devils Tower National Monument, Theodore Roosevelt National Park, USGS, BLM, USFWS, USDA-NRCS. Numerous local universities, businesses and agencies including Custer State Park, Spearfish Forest Products, and South Dakota State University attended. National NGOs and their local representatives from The Nature Conservancy, the World Wildlife Fund, and Sierra Club joined the two-day event. Most importantly, there was representation from the Pine Ridge Reservation's Oglala Sioux Parks & Recreation Authority. The entire workshop was facilitated by a team from Colorado State University and graduate students in the new Conservation Leadership through Learning program.

The objectives of the workshop were to: (1) Increase awareness of the extent of observed and projected climate change impacts in southwestern South Dakota and eastern Wyoming. (2) Provide the opportunity for practitioners and managers to network and see examples of multi-agency climate change adaptation planning efforts. (3) Increase and reinforce trust and willingness to work across jurisdictional boundaries. (4) Begin to develop a shared vision and set of common action items for managing shared resources that will help build resilience to climate change.

The workshop included presentations on climate change impacts in the local ecosystem, natural resource management under climate change, agency tools for climate change adaptation planning, including scenario planning and vulnerability assessments, and a multi-agency adaptation case study from the Olympic Peninsula in Washington. The workshop included several facilitated working group sessions, charging participants to identify what climate change effects related to (1) vegetation, (2) wildlife, (3) water, (4) human dimensions/people-related issues, (5) cultural resources and (6) caves and geologic issues that cross the boundaries they manage. During full-group discussions, participants also identified what adaptation options might be feasible and through real-time audience polling (iClicker voting), they identified 3-5 top priorities most ready for collaboration across neighboring jurisdictions (see Table 2).

Table 2. Top Concerns & Priorities for Multi-agency Collaboration on Climate Change Adaptation in Southwestern South Dakota

Vegetation Working Group

Top Concerns about Vegetation:

1. Sustainability and Resilience of the Species on the Landscape (30%)
2. Water Quality and Quantity Available for Vegetation (19%)
3. Biodiversity Loss (18%)
4. Invasive Species (18%)
5. The Changing Composition of Native Plant Species (15%)

Top Priorities for Collaborative Action:

1. Conduct Multi-agency Vulnerability Assessments – broader than any one Park or Forest (46%)
2. Develop and implement a communication plan to build internal agency and public awareness about vegetation impacts (29%)
3. Develop a coordinated drought management plan (14%)
4. Create a seed bank (11%)

Wildlife Working Group

Top Concerns about Wildlife:

1. Habitat Fragmentation (56%)
2. Changes in Vegetation Type & Cover (19%)
3. Water Quantity and Quality Available for Wildlife (14%)
4. Spread of Disease (6%)
5. Effects to Endangered Species & ESA Conflicts (6%)

Top Priorities for Collaborative Action:

1. Develop more infrastructure for strategically planned land purchases and increase conservation easement opportunities (43%)
2. Facilitate interagency agreement on keystone and least resilient species through a scientific process to identify climate vulnerable species and corridors (27%)
3. Alter current agency grazing management protocol and policy to promote more natural processes (20%)
4. Develop a communication strategy to increase public awareness about fire threats

to wildlife (7%)

5. Increase and promote genetic banking and captive breeding to maintain certain species' health and existence (4%)

Water Working Group

Top Concerns about Water:

1. Drought and the impacts of climate change in the region (30%)
2. Water quantity and changes in annual precipitation (28%)
3. Population growth and the impacts on available water supply (17%)
4. Changes in water quality (16%)
5. The impacts of groundwater pumping (9%)

Top Priorities for Collaborative Action:

1. Develop a multi-agency protocol for monitoring and assessing changing water trends (41%)
2. Increase communication and collaborative planning among agencies and stakeholders about/for improved water quality (36%)
3. Develop an education plan based on shared science and make it very location-specific (20%)
4. Identify other opportunities for education and community outreach about water quantity and quality (4%)

People Working Group

Top Human Dimensions Concerns:

1. The need to optimize wise use of scarce resources (37%)
2. Changing economic dynamics and stresses on local livelihoods (31%)
3. The disconnect or tension between agencies and ranchers (21%)
4. The need for more youth engagement in climate change and landscape issues (10%)

Top Priorities for Collaborative Action:

1. Creation of policy and economic incentives for conservation (65%)
2. Create new/different mediums and channels for communicating about climate change and adaptation in the region (21%)
3. Develop opportunities for alternative income generation (7%)

4. Facilitate more community-based outdoor activities to inspire a connection to place and desire to participate in conservation (5%)

Cultural Resources Working Group

Top Cultural Resource Concerns:

1. Impacts on traditional subsistence activities (41%)
2. Increased pest and disease disturbances (20%)
3. Impacts to archaeological sites (16%)
4. Impacts to historic sites (12%)
5. Impacts to sacred sites (12%)

Top Priorities for Collaborative Action in Managing Cultural Resources:

1. Develop a protocol for sharing data, perspective, experiences, processes and lessons learned across agencies (32%)
2. Develop a prioritization process for vulnerable cultural resources (32%)
3. Develop interpretation and education programs related to the climate change impacts on cultural resources (21%)
4. Strive to be more inclusive in scope; in respect to multi-agency collaboration (12%)

Caves & Geology Working Group

Top Concerns about Caves & Geology in a Changing Climate:

1. Changes in groundwater and surface water (54%)
2. Run-off, erosion and flooding events (17%)
3. Changes to cave ecosystems, for example changing bat habitats (14%)
4. Extreme weather events (7%)
5. Changes in erosion rates (7%)

Top Priorities for Collaborative Action:

1. Create a mechanism for multi-agency water quality monitoring (44%)
2. Develop better/new infrastructure for a changing climate; use eco-mimicry and promote more flexible system design in facilities and structures (35%)
3. Promote the use of natural, biodegradable alternatives for fertilizers and pest control (19%)

Border Crossing: Preparing for & Adapting to Climate Change Effects in Northern Colorado
https://sites.google.com/site/climatechangeadaptationnoco/
Website includes: workshop goals and objectives, workshop agenda, workshop presentations, post workshop survey, workshop photos, resources and references, and collaborative climate change adaptation action items.

Adaptation Planning for Grasslands & Forests in the Black Hills and Plains
https://sites.google.com/site/bordercrossingworkshop/
Website includes: workshop goals and objectives, workshop agenda, workshop presentations, workshop photos, resources and references, participant list, and an executive summary of the workshop outcomes.

Number of students participating in this project: undergraduates, graduate students, degrees conferred.
Undergraduate Research Assistants: Karina Mullen and Priscilla Williams – assisted in organizing workshop logistics, registration and compiling pre-workshop survey results.
Graduate Research Assistants: Shawn Davis and Sarah Schweizer – assisted in organizing the workshops and writing up the results of the workshops.
The working group discussions at the first workshop were facilitated by several graduate students in the Human Dimensions of Natural Resources program at Colorado State University.
The working group discussions at the second workshop were facilitated by a team of 12 graduate students from Colorado State University in the new Conservation Leadership through Learning program.