



Western Tri-State Consortium Innovation Working Group Report

Building resilience in water governance: an
interdisciplinary investigation into the social-ecological
system dynamics of climate change

Synergia Ranch, New Mexico
10th – 14th January 2013



Participants

Nevada/Colorado Basin:

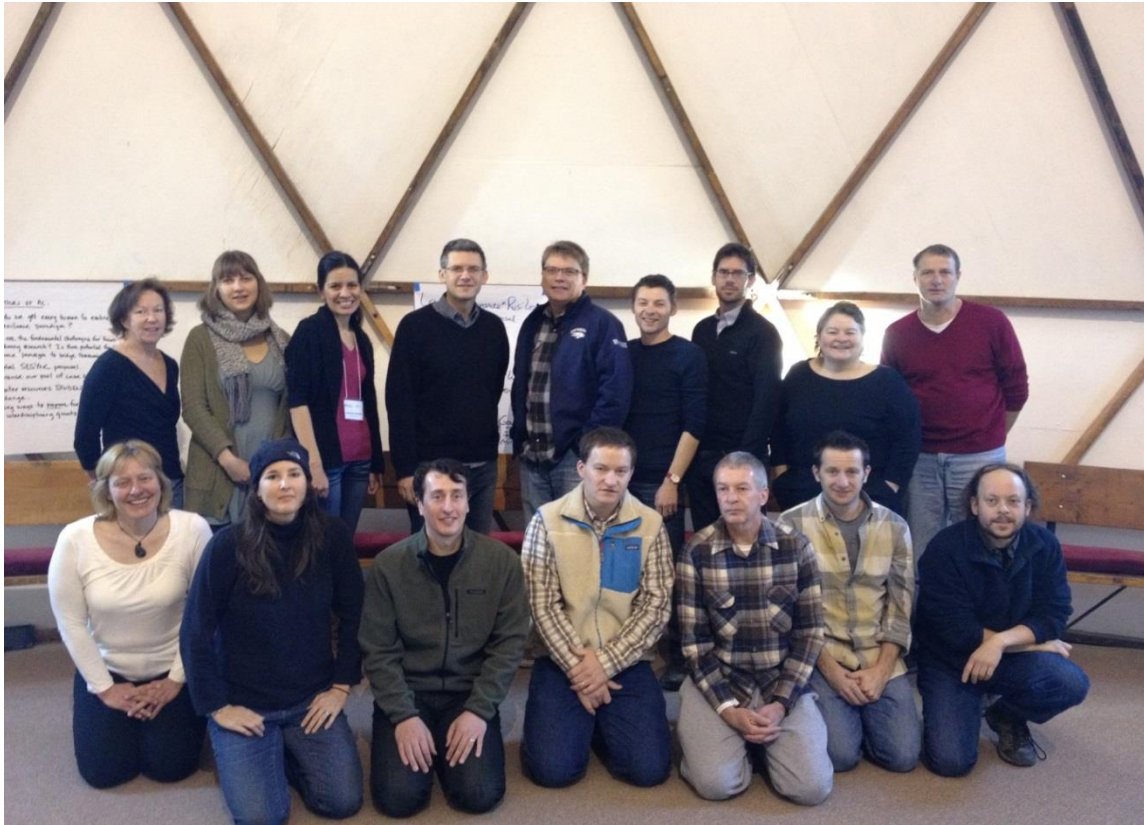
1. Derek Kauneckis, Department of Political Science, University of Nevada (public policy, institutional analysis, environmental policy and methodology)
2. Scott Bassett, Department of Geography, University of Nevada (planning, conservation biologist and geographic information systems specialist)
3. Mary Ann Rozance, Department of Political Science, University of Nevada

Idaho/Columbia River Basin:

1. Barbara Cosens, School of Law, University of Idaho (bcosens@uidaho.edu)
2. Jan Boll, Department of Environmental Science, University of Idaho (jboll@uidaho.edu)
3. Alexander K. Fremier, Department of Fish & Wildlife Sciences, University of Idaho (afremier@uidaho.edu)
4. Robert Heinse, Department of Soil Physics, University of Idaho (rheinse@uidaho.edu)
5. Timothy E. Link, Department of Forest, Rangeland, and Fire Sciences, University of Idaho (tlink@uidaho.edu)
6. Toni E. Turner, M.S., P.E. Hydraulic Engineer Bureau of Reclamation
7. Brian Chaffin, Ph.D. Candidate, Geography, Oregon State University (chaffinb@science.oregonstate.edu)

New Mexico/Rio Grande Basin:

1. Melinda Harm Benson, Department of Geography and Environmental Studies, University of New Mexico
2. Vanessa Valentin, Department of Civil Engineering, University of New Mexico (valentin.vanessa@gmail.com)
3. Cliff Dahm, Department of Biology, University of New Mexico (cdahm@sevilleta.unm.edu)
4. Ryan Morrison, Department of Civil Engineering, University of New Mexico, (rmorriso@unm.edu)
5. Mark Stone, Department of Civil Engineering, University of New Mexico (stone@unm.edu)
6. Dagmar Llewellyn, Bureau of Reclamation
7. Imogen Ainsworth, Department of Geography, University of New Mexico
8. Christopher Lippitt, Department of Geography and Environmental Studies, University of New Mexico
9. Mark Lawler, Department of Geography and Environmental Studies, University of New Mexico



Problem Statement/Outcomes

The IWG brought together researchers from different institutional (University of New Mexico, University of Idaho, University of Nevada, Bureau of Reclamation) and disciplinary backgrounds to participate in the development of an interdisciplinary research agenda for investigating resilience-based water governance in the face of climate challenges. Specifically, the group focussed on assessing the capacity of existing legal and institutional frameworks to foster resilience in the Columbia and Rio Grande watersheds, two social ecological systems (SESs) at the core of the NSF EPSCoR Western Consortium research efforts.

As climate change predictions are repeatedly revised to suggest impacts more imminent and more severe than previously estimated (see for e.g. IPCC, Smith et al, 2009), we are forced to acknowledge the possibility of non-linear change associated with SES ‘tipping points’. Indeed, it has been suggested that some critical thresholds may have already been crossed. In this context, questions have been raised as to whether the prevailing discourse of sustainability is sufficient to allow management in the face of considerable uncertainty, or whether it is, in fact, based on invalid assumptions of stationarity. Adaptive management for resilience has been posited as an alternative discourse around which to base future management decisions.

This project aims to assess cross-scale SES interactions within the Columbia and Rio Grande watersheds from an interdisciplinary perspective, as well as identify potential ‘tipping points’ within the system and determine how these might be better understood by policy-makers and integrated into more adaptive water governance frameworks.

The IWG was intended as a first step in establishing an ongoing cross-jurisdictional, interdisciplinary research effort and the achievement of outcomes set out in the initial project proposal:

1. Research proposal to the NSF Dynamics of Coupled Natural and Human Systems program
2. Larger law-focused NSF EPSCoR workshop
3. Special session at Association for Environmental Studies and Sciences (AEISS) annual meeting in June 2013
4. 'Policy Analysis' article for submission to the *Journal of Environmental Studies and Sciences*, the AEISS' interdisciplinary journal

In addition to laying the groundwork for the achievement of these outcomes, the workshops also opened up additional research opportunities and avenues for further collaboration. In particular:

5. Paper focussing on the value of and recommendations for interdisciplinary work
6. Further development of connections between the participating institutions through a Tri-State Consortium research network and linking of degree courses/programs



Approach

Materials and research were made available using a 'dropbox' prior to the IWG in order to ensure that all participants entered into the workshop with an understanding of the concepts and issues being discussed and the outcomes anticipated.

The IWG was held over three days at Synergia Ranch, New Mexico. A mixture of group presentations, discussion and break-outs were used in order to capitalize on the range of expertise of those present.

While a detailed IWG agenda is attached at the end of this report, key discussions are summarised below:

Day 1: 11th January 2013

The IWG began with a general discussion about the potential of 'resilience' as a new paradigm for thinking about the watersheds under consideration and SESs more broadly. Resilience should not be understood as inherently 'good' or 'bad,' or as entailing an explicit set of management

objectives but rather, as a theoretical framework for thinking about management in the context of uncertainty and the potential for non-linear change.

The Idaho team then presented on their current research, which takes resilience as a lens through which to view the Columbia River basin. While it is acknowledged that the particular management solutions developed in the context of the Columbia basin are unlikely to be transferrable, the processes by which they are reached include:



1. Characterize the SES – eco-system services/potential thresholds
2. Institutional/Jurisdictional mapping – how actors interact on different scales
3. Identify gaps – opportunity to build adaptive capacity
4. Legal analysis – remove barriers through law and facilitate local capacity building.

Participants from the Bureau of Reclamation described existing programs evaluating the hydrological impacts of climate change under the SECURE Water Act including the WaterSMART Basin Study Program west-wide climate risk assessment. The institutional challenges of incorporating resilience into management frameworks were also discussed.

A preliminary discussion on emerging research questions focussed on:

1. Assessing how concepts of resilience are understood and applied by the Bureau of Reclamation and how potential thresholds and adaptive capacity of the system might be assessed
2. The transferability of the Columbia process and the potential of institutional mapping to inform management. The potential of River Basins as a unit for comparative studies of resilience/adaptive capacity in SES.
3. The potential of interdisciplinary work for the assessment of complex problems. Educational opportunities associated with engaging in cross-jurisdictional, interdisciplinary work.

Day 2: 12th January 2013

Day two began with a discussion on the value of and challenges associated with interdisciplinary work generally.

The Idaho team introduced their ‘toolbox’ survey, which encourages participants to consider how they think about knowledge production and use as well to evaluate the values inherent in their own and others’ research. The ‘toolbox’ is designed to establish a common dialogue between participants from different theoretical/ideological backgrounds and reach a mutual

understanding for interdisciplinary work. The institutional challenges associated with interdisciplinary work within academic frameworks were also discussed, stimulating a discussion of the potential of interdisciplinary work from both a research and educational perspective. Emerging from this discussion is the potential for a paper focussed on interdisciplinary work and how it might be better understood, supported and assessed.

The preliminary research questions generated on Day 1 were then revisited and clarified and participants used “dots” to indicate how they thought these questions should be prioritized (high, medium, low) for further consideration.

Based on participant prioritization of the emerging research questions, two break-out groups were formed to focus on 1) resilience in the context of Bureau of Reclamation research and management efforts and 2) the Columbia process.

From these break-out sessions, some key questions/areas for further consideration emerged:

- Can ‘critical information thresholds,’ associated with ‘ecological thresholds,’ be identified at which knowledge generates change in management actions?
- Might simplified models enhance decision-making and adaptive capacity in management frameworks?
- How might knowledge be presented or conveyed to most effectively foster adaptive capacity?
- How might the adaptive capacity of institutions on different scales be assessed?
Is there a role for institutional mapping and network modelling in examining the relationships between information and decision-making at multiple scales?
- The need for a comprehensive review/synthesis of relevant literature was discussed



The Idaho PI, Barb Cosens, gave an overview of her work looking at the ways in which it might be possible to translate resilience thinking into legal/decision making processes, changing the law in order to facilitate greater use of adaptive management. Three workshops were planned, looking at how to integrate resilience thinking into law.

Next, the group discussed the potential for a tri-state collaboration program to facilitate knowledge transfer on how to make interdisciplinary research work. Representatives from the three Universities present outlined the characteristics of their water resources program and discussed the possibility of cross-linking courses.

Day 3: 13th January 2013

The final day served to bring together the ideas and research questions discussed over the course of the workshop as well as clarify and allocate tasks moving forward.

The development of a competitive proposal to the NSF Coupled Human Natural Systems program was seen by many of the participants as a key outcome of the workshop. The proposal

will focus on interdisciplinary work to investigate key questions that emerged during the course of this IWG:

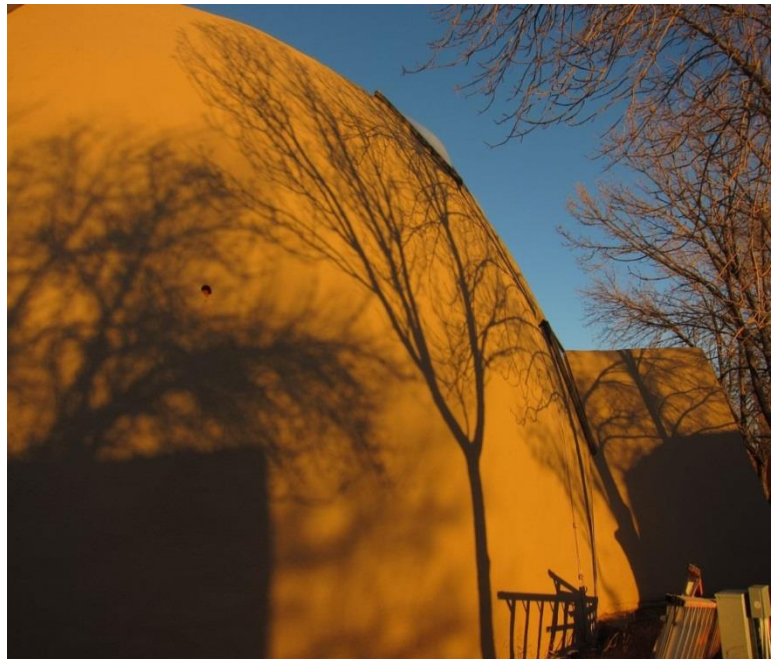
- Can looming thresholds with the potential to stimulate non-linear change if crossed be identified in SESs?
- How do human systems react to non-stationarity and consequential unfolding ecological thresholds across scales?
- How is knowledge conveyed to move decision making toward the development of adaptive capacity in terms of willing to make decisions in the face of uncertainty?
 - What are the critical thresholds for knowledge producers to make decisions in the face of uncertainty?

The Bureau of Reclamation River Basin studies provided a unit for the assessment of and comparison between SES dynamics. The theoretical constructs advanced using basin level case studies, relating to ecological thresholds and critical information thresholds for management will have broader implications in the context of resilience thinking, adaptive management and the development of watershed governance frameworks better placed to tackle looming climate challenges.

Outcomes from the Workshop

The IWG resulted in the following action items:

- Development of a competitive proposal to National Science Foundation
 - PIs identified at the Workshop (Melinda, Mark, Derek and Alex) and will develop the proposal with on-going input from other participants
 - Since the workshop, NSF issued a special call for Water Climate Sustainability proposals, and the lead PIs are now focusing on that call, with a deadline of September 2013.
- Development of a law-focused proposal to the National Socio-Environmental Synthesis Centre (Barb is moving forward with this proposal)
- Publications:
 - Synthesis paper (Ryan, Tim, Barb, Robert, Vanessa)
 - Essay on value of interdisciplinary work – building on previous work to provide concrete recommendations (Melinda, Chris, Jan, Derek)
 - Target: ‘Policy Analysis’ article for submission to the Journal of Environmental Studies and Sciences, the AESS’ interdisciplinary journal



- Paper session and academic conference
 - Special session at Association for Environmental Studies and Sciences (AEES) annual meeting in June 2014 (Melinda)
- Continued discussions regarding future synergies with Tri-state consortium, including:
 - Cross-listing courses between tri-state water resources programs
 - Further development of connections between the participating institutions through a Tri-State Consortium research network and linking of degree courses/programs.

In addition many participants expressed a desire to continue the conversations that had taken place over the course of the workshop and to further develop the links established between individuals and the participant institutions. A 'cyber coffee' shop has been set up, meeting virtually once a month to provide updates on progress to date and a forum for the discussion of relevant literature.

Workshop Evaluations



Online evaluations were completed by participants after the workshop as an opportunity to provide feedback on the IWG. The vast majority of participants felt that the workshop had been organized and facilitated effectively and had been a valuable experience overall.

Most participants also responded that they expected to work on one or more proposals, projects or publications as a result of the IWG and that they saw the potential for cross-institutional activities to enhance their own work.

Comments emphasized the value of the connections made over the course of the weekend and the benefits of working with others from different institutional and disciplinary backgrounds. In addition, the reaction to Synergia Ranch as a venue for this style of workshop was overwhelmingly positive.

Synergia Ranch was an inspirational setting. We did not realize until we arrived that it is the community that invented, built and lived in Biosphere 2! We ended up dedicating one evening to a presentation and discussion regarding Biosphere 2. The painting below is by ranch manager Marie Harding, depicting the rainforest system of Biosphere 2—complete with a Gala go—one of the main mammalian species in the system!



IWG Agenda 01/10/13 – 01/14/13

January 10 - Travel day

7:00pm Dinner
Informal evening discussion regarding the nature of interdisciplinary work

January 11

7:00-8:00 Breakfast

8:00 Welcome, introductions, agenda review

8:30 Overview of goals/outcomes for IWG session

9:00 Resilience thinking—is it a new paradigm?

- Is resilience a useful concept for bridging ecological science water management?
- Discussion will be based in part on required readings

10:00-10:15 Break

10:15-Noon Introduction to our watersheds and application of resilience

- UI: UI team will present scale mapping, threshold identification and adaptation process applied to the Columbia River
- UNM: UNM team will present on transferability of UI work to the Rio Grande River
- U. Nev.: Nevada team will start the dialogue commenting on the UI and UNM presentations leading to a facilitated dialogue that will continue through lunch

Noon-1:00 Working Lunch: Bureau of Reclamation update on West-Wide Water Risk Assessment, WaterSMART and possible synergies with IWG research agenda

1:00-1:30 Break

1:30-5:00 Discuss potential research questions emerging from the morning dialogue

5:00 Adjourn—informal discussion over dinner

January 12

7:00-8:00 Breakfast

8:00-9:00 Group discussion on challenges and opportunities in interdisciplinary research

9:00-10:00 Refine proposed research questions and identify working groups for break-out sessions

10:00-10:15 Break

10:15-Noon	Breakouts: Research proposal development (intellectual merit, transformative ideas, broader impacts); discussion and development of education/dissemination strategies
Noon-1:00	Lunch
1:00-2:00	Breakouts: Identification of pre-criteria for larger, law-focused NSF workshop
3:00-5:00	Full group meeting reporting on results of breakout sessions
5:00-7:00	Break
7:00	Dinner
January 13	
8:30-10:00	Finalization of proposal research tasks and proposal details, including task assignments and timeline
10:00-10:15	Break
10:15-1:00	Development of strategies for moving forward <ul style="list-style-type: none"> ▪ Identification of further funding opportunities ▪ Discuss and assign tasks for AESS paper session and publication ▪ Participant evaluation/assessment (via both questionnaires and group discussion)
1:00	Lunch and travel home