



The Center for Science and Technology Policy Research was established within CIRES to focus on research, education, and outreach at the interface of science, technology, environment and the needs of decision makers in public and private settings. The Center works to create new knowledge and improve the ways by which science and technology policies address societal needs, through/research projects that bring the tools of the social and policy sciences to bear on topics of interest to CIRES, NOAA, and the broader science and technology community.

CLIMATE ADAPTATION

Assessing Colorado's Climate Adaptability

Bobbie Klein and Bill Travis contributed to the Western Water Assessment's *Colorado Climate Preparedness Project*, which assessed climate impacts and adaptation in 5 climate-sensitive sectors in Colorado: water, agriculture, electricity, wildlife/ecosystems/forests, and outdoor recreation. Among the findings and recommendations:

- Decision making under uncertainty was a key challenge in all the sectors. Even agencies that explicitly incorporate climate variability into planning are struggling with uncertainty of long-term projections and the incompatible timescales of climate change and existing planning tools.
- Impacts in the water sector---e.g., changes in runoff patterns, snowpack, and storage---propagate through the other sectors, and should be a key focus of impacts studies.
- Monitoring is critical, both of climate variability/change and of the effectiveness of climate adaptations.

EXTREME EVENTS AND DISASTERS

Drought Responses among Rocky Mountain Ranchers

Kristin Gangwer, with support from the Western Water Assessment, studied drought responses among ranchers in the "3 Corners" of Utah, Wyoming and Colorado, an area that experienced severe drought in 2002.

Responses fell into a typology of: (1) short-term adjustment to direct impacts, (2) buffers that help insulate the livestock enterprise from climate variation, and (3) adaptations that fit ranching to the underlying climate and ecology. The most effective response was herd reduction, but ranchers were reluctant to de-stock not knowing if the drought would continue. Attempts to carry livestock with feed, and quick re-stocking despite slow range recovery, were detrimental to both enterprise economics and range vegetation.

COPING TACTICS	BUFFERING MECHANISMS	LONG-TERM ADAPTATIONS
Purchasing feed	Using fewer than maximum allotted AUMs	Purchasing additional property
Keeping cattle at home and feeding (not sending to federal range)	Stocking below maximum capacity	Diversifying products (e.g., yearlings)
Moving livestock to feedlot	Storing extra feed or purchasing in advance	Developing water sources
Shipping livestock to another region	Maintaining multi-year financial cushion	Improving fencing
Reducing herd	Culling thoroughly	Vegetation treatments
Borrowing money/restructuring loans	Reducing supplementary products (e.g., yearlings)	Working off ranch (long-term)
Leasing extra pastures	Keeping fewer replacement heifers	Running different cattle (smaller, more suited to drier country)
Hauling water	Taking out insurance policy	Implementing and/or improving rotational grazing system
Reducing time on range	Saving pastures as a reservoir	Purchasing semis and water tanks
Working off the ranch (temporarily)		
Downsizing financially/reducing expenses		
Selling non-essential products (yearlings, etc.)		
Stretching hay with supplement		
Applying for disaster assistance		
Selling some property (often for development)		

MEDIA AND CLIMATE CHANGE

Global Coverage of Global Warming

Max Boykoff tracks media coverage of climate change or global warming each month in fifty newspapers across twenty countries around the world. Articles per source per month in Europe, North America, and Oceania were quite a bit higher than the other regions, up until the end of 2009 at the time of the UN Conference of Parties meetings in Copenhagen. Since that time there has been a great deal of convergence across regions. Increasing coverage in other regions can be attributed in part to many efforts that have sought to increase capacity of journalists in these countries to cover climate-related issues.

Getting Sea Level Right

Effective media reporting of sea level rise projections: 1989-2009 (Ursula Rick, Max Boykoff and Roger Pielke, Jr.), examined how sea level rise projections have been represented in prominent newspapers over the past two decades. The research found that - with few exceptions - journalists have accurately portrayed scientific research on sea level rise projections to 2100. Journalists have paid particular attention to the issue in years when an IPCC report is released or when major international negotiations take place, rather than when direct research is completed and specific projections are published.

ENERGY, CARBON AND TECHNOLOGY

The Climate Fix

Roger Pielke Jr.'s recent book, *The Climate Fix*, uses this figure to illustrate the annual average rates of decarbonization that would be necessary to reduce global CO2 emissions 50% below 1990 levels by 2050. The global economy would have to decarbonize from the 2006 rate of 0.62 tonnes of CO2 per \$1,000 GDP to below 0.20 in 2050 for all rates of GDP growth, or about 4.4% per year. The world achieved a 1.5% decarbonization rate from 1980-2006. Achieving the 50% reduction goal will require advances in decarbonization beyond that observed over the past century.

Stewarding Carbon

Land use plays a key role in addressing climate change. The potential for carbon sequestration depends on who owns the land and what drives their management decisions. Lisa Dilling and Betsey Failey's paper, *Carbon stewardship: land management decisions and the potential for carbon sequestration in Colorado, USA*, examines carbon stewardship across public and private ownership. Achieving the fullest potential for sequestration requires mechanisms effective under different land use regimes such as multiple-use, different historical precedents, and market and non-market decision drivers. For example, over half of Colorado's terrestrial carbon is managed by public agencies with no carbon storage mandate and no mechanism for valuing carbon in their land use decisions.

DECISION MAKING UNDER UNCERTAINTY

Managing U.S. Water Resources in a Changing Climate

Christine Kirchhoff and Lisa Dilling's *Managing U.S. Water Resources in a Changing Climate* project is examining how climate-related information is used in water management contexts across vertical scales, as well as in different contexts across comparable horizontal scales. They begin with the premise that with heightened uncertainty water resources management must be dynamic and responsive and seek flexible solutions. Preliminary results have identified four important confounding factors:

- risk perception matters
- technoscientific information is important but must be incorporated into decision making
- political considerations influence decision making for both drought and climate change
- understanding who has what authority to affect change in water resources management and by what mechanisms is key

SCIENCE AND INNOVATION POLICY

Reconciling the Supply of and Demand for Research in the Science of Science and Innovation Policy

Twenty-seven science and technology policy scholars and practitioners from around the world attended a workshop in Oslo, Norway, organized by Roger Pielke, Jr., to discuss the following question:

How can scholars who study science and innovation policy contribute more effectively to the needs of policy makers facing decisions about science and innovation policy?

Roger and ASU colleague Dan Sarewitz presented an analytical approach to this question that conceptualized science in terms of a "supply" of knowledge and information, societal outcomes in terms of a "demand" function that seeks to apply knowledge and information to achieve specific societal goals, and science policy decision-making as a process aimed at "reconciling" the dynamic relationship between "supply" and "demand." The core of their argument was that "better" science portfolios (that is, portfolios viewed as more likely to advance desired societal outcomes) would result if science policy decisions reflected knowledge about the supply of science, the demand for science, and the relationship between the two. They provided a general method for achieving this, and used the example of climate change science to illustrate how research on science policy could be organized to support improved decisions about the organization of science itself.

CENTER BOOKS

COMING SOON:

Who Speaks for the Climate? Making Sense of Media Reporting on Climate Change by Maxwell T. Boykoff (September 2011)

The New Carbon Economy: Constitution, Governance, and Contestation edited by Peter Newell, Maxwell T. Boykoff, and Emily Boyd (2011)

The Wicked and the Wild: Why You Don't Have to Love Nature to be Green by Benjamin S. Hale (2011)

CENTER EDUCATION

The Graduate Certificate in Science and Technology Policy, now in its seventh year, is a rigorous educational program to prepare students pursuing graduate degrees for careers at the interface of science, technology, and decision making. Upon completion students will have attained a measure of understanding of the broad societal context of science and technology as well as an introduction to methodologies of policy analysis that are used in decision settings related to science and technology. The program currently includes twenty-three students from a variety of CU departments and institutes. Nineteen students have already completed the program and have gone on to serve in positions at the House Science Committee, Office of Management and Budget, and congressional staff. **More Information:** <http://sciencepolicy.colorado.edu/stcert>

CENTER OUTREACH

The Center disseminates its research through a variety of means including:

- Talks and presentations by Center personnel
- Articles in peer reviewed journals & non-peer reviewed publications
- Ethics, Policy and Environment (co-edited by Benjamin Hale)
- Content rich, recently redesigned website (<http://sciencepolicy.colorado.edu>)
- Newsletter, Ogmios, (<http://sciencepolicy.colorado.edu/ogmios>)
- Bimonthly briefing sent to 3,900 Washington, DC decision makers.
- Weblogs maintained by faculty & staff:
 - Roger Pielke Jr.'s Blog (<http://rogerpielkejr.blogspot.com>)
 - Cruel Mistress-Being Human on a Harsh Planet (<http://cruelmistress.wordpress.com>)