University of Colorado

Center for Science and Technology Policy Research

Annual Report

July 1, 2004 — June 30, 2005

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Table of Contents:

Staff Highlights:

Message From The Director

Science policy issues continue to occupy much attention in the national and international arenas. In the United States, 2004 will be remembered for a bitterly contested presidential contest that focused attention on stem cell research and scientific integrity in policy making. The climate debate was at the center of discussion of the 2005 G8 Summit in Scotland, and will also be on the agenda in Russia and Japan in 2006 and 2007, assuring continued attention to this issue. Debate and discussion continued over rescuing the Hubble Space Telescope, the return to flight of the space shuttle and the President's space exploration "vision," funding for science and technology that saw an end to the record increases experienced in recent years, the fidelity of drug approval processes in the face of hidden risks of previously approved drugs and conflicts-of-interests surfacing in the Food and Drug Administration, and policy responses to natural disasters such as the Indian Ocean tsunami of December 26, 2004, among other issues. In short, we have found no shortage of interesting and worthwhile subjects to investigate.

As you look over this report you will see that Center staff had another remarkable year in research, education and outreach. We are fortunate to add to our staff Lisa Dilling, whose research focuses on developing effective mechanisms for connecting science and decision making, and Linda Pendergrass, who brings her considerable skills and experience to the role of Center Office Manager. The Graduate Certificate in Science and Technology Policy was awarded to its first two recipients, Genevieve Maricle and Erik Fisher. We are proud to boast that the Certificate Program currently includes students from 11 different departments on campus. And we are very pleased that Prometheus, our weblog and experiment in outreach, has developed into an effective tool to reach people around the world and stimulate feedback on our work. 2005-2006 looks just as exciting.

In 2004-2005 we took several big steps toward long-term sustainability at the University of Colorado. One such step was winning a major grant from the National Science Foundation for a project titled "Science Policy Assessment and Research on Climate." Another was the commitment by the University to two new faculty hires at the Center over the next few years. Consequently, we will be seeing many new faces at the Center. We continue to face challenges in securing the long-term support necessary for the core operations (i.e., non-project related aspects) of the Center and will redouble our efforts in 2005-2006 to ensure a sustainable focus on science and technology policy research.

We hope that you will find this report to be informative. Your feedback is always welcome.

Roger Pielke, Jr., Director
pielke@colorado.edu

Center for Science and Technology Policy Research
2004-05 Annual Report
Introduction

Welcome to the Center for Science and Technology Policy Research's 2004-05 Annual Report. This report describes the Center's FY 2005 research, education, and outreach activities in fulfillment of its vision, which is "to serve as a resource for people, groups, or institutions that make decisions about science and technology," as well as its mission, which is to "conduct research, education, and outreach to improve the relationship between societal needs and science and technology policies." Center activities fall within the following themes:

1) ***Evaluating the relationship between societal needs and science and technology policies.***

The Center evaluates the two-way connections between decision makers and scientific researchers and develops recommendations to improve the flow of useful information in both directions. This evaluation often involves "learning by doing," that is, by developing and assessing experimental partnerships between operational and research communities.

Examples of projects and activities under this theme include **Science Policy Assessment and Research on Climate (SPARC)** and **Carbon Cycle Science** that aim to improve the connection between science policies and information needed for decision making; **Scales of Decision Making and the Carbon Cycle** that examines the relationship of scales in carbon cycle science to scales needed for decision-making; **Climate Services Clearinghouse** that compiles climate services from across sectors to enable providers of those services to identify and fix overlaps and gaps in services; and **Hydro-climate Research and Decision Making** that has developed experimental partnerships with the Colorado Basin River Forecast Center and the NWS Office of Hydrologic Development.

2) ***Providing new policy alternatives for science and technology policy decision makers.***

Center research seeks to expand and/or evaluate policy alternatives available to science and technology policy decision makers. A science and technology policy decision maker is a person, group, or institution with responsibility for making important decisions about the substance or process of science and technology. Examples of science and technology policy decision makers include people who allocate resources among research areas and people who prescribe norms for the conduct of research, such as rules for using human subjects. This perspective distinguishes the Center's work from that of policy advocacy groups, which seek to reduce available alternatives in the political process.

Examples of projects and activities under this theme include the **Science Policy Assessment and Research on Climate (SPARC)** project that will identify alternative research portfolios for science policy decision makers, and **Lightning, Outdoor Stadiums, and Spectator Safety**, a student project that is evaluating policy alternatives for large outdoor stadiums to protect spectators from injury caused by lightning.

3) ***Developing tools for science and technology policy decision making.***

Through its research the Center develops tools, and through its outreach it communicates these tools to science and technology policy decision makers to help them identify, evaluate, and eventually fill their information needs.

Projects and activities under this theme include **Hydro-climate Research and Decision Making** which is working to provide improved forecasting capabilities to help meet the decision-making needs of water managers; the **Science Policy Assessment and Research on Climate** and **Carbon Cycle Science** project which is developing tools to assist government agencies in making the scientific research they fund more relevant to potential users of that science; and the **Graduate Certificate in Science and Technology Policy** which trains graduate students to become proficient in various methodological approaches to policy analysis and research.

What's New

Several new research projects were launched at the Center in 2004-05:

Science Policy Assessment and Research on Climate (SPARC) (Pielke, Dilling)

In partnership with Arizona State University's Consortium for Science, Policy, and Outcomes, the Center launched its **Science Policy Assessment and Research on Climate (SPARC)** project under the National Science Foundation's Decision Making Under Uncertainty (DMUU) program this past year. SPARC conducts research and assessments, outreach, and education to provide knowledge and tools that science policy decision makers can draw upon to improve the compatibility between the supply of and demand for climate science information. This process of reconciliation can minimize the role of scientific uncertainty as an obstacle to climate policy decision making by enhancing understanding between supply and demand sectors, and by helping to satisfy the perceived information needs of the demand side in the context of its institutional capabilities for information use.

The SPARC research agenda focuses on two themes: "Reconciling Supply and Demand for Climate Research," or how climate research agendas are developed and user demand for research assessed; and "Sensitivity Analysis," or how specific issues are prioritized given the multiple causes of global environmental change.

Within those themes SPARC has four ongoing research projects: Climate Science Policy in the Regional Integrated Science and Assessment (RISA) Program; Reconciling Supply and Demand-Carbon Cycle Science Activities; Ecosystem Function Sensitivity Analysis Activities; and Extreme Events and Climate Change Sensitivity Analysis Activities.

SPARC's primary activities this past year were developing a website (see web address below) and organizing two workshops. The first workshop, **Decision Support and Carbon Cycle Science: Practical Strategies to Reconciling the Supply of and Demand for Carbon Cycle Science** (http://sciencepolicy.colorado.edu/sparc/research/projects/rsd/ccworkshop05.html), was held June 13-14. The goals of this workshop were to share knowledge across areas of expertise, foster an interested community of researchers, and develop a research agenda with the ultimate aim of improving the usefulness of carbon cycle science for the broader community of decision makers. The workshop surveyed existing knowledge about successful decision support using carbon cycle science; enabled cross-disciplinary transfer of knowledge about how to design and implement research agendas, projects and programs so that they can effectively serve users' needs; and developed a research and practice agenda for programs and scientists in carbon cycle science who are interested in serving the needs of users outside of the scientific community.

The second workshop, **2005 Workshop on RISA Science Policy** (http://sciencepolicy.colorado.edu/sparc/research/projects/risa/risaworkshop05.html), was held August 15-17. The workshop brought together ~30 participants from each of the Regional Integrated Science and Assessment (RISA) teams to address questions such as:

- How are stakeholders' needs reflected in the research prioritization process?
- How are stakeholders' needs assessed and evaluated?
- How does each RISA prioritize areas of research and assessment to which to devote its resources?
- How does each RISA evaluate its resource allocation decisions?

The overarching goal of the workshop was to distill from the RISA projects those processes, institutions and other conditions that facilitate making decisions about climate science research priorities that lead to useful information for decision makers. The workshop evaluated the extent to which climate science policy in the RISAs can serve as "a model that could guide some of the larger efforts within USGCRP."

Other SPARC activities this year include:

- **Presentations**

  Dilling, L., Pielke, Jr., R., and Sarewitz, D. Pilot study on reconciling supply and demand: Who are the consumers of information on the North American carbon balance? American Geophysical Union 2004 Fall Meeting.

- **Papers**

  Dilling, L., Pielke, Jr., R., and Sarewitz, D. Incorporating usable science into the North American Carbon Program: Building a framework for research (in preparation).

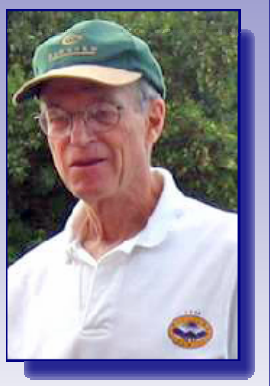
- **Master's Thesis**

  Lisa Dilling is supervising Nat Logar's Masters Thesis and publication. Title: Supply and demand of carbon cycle science in the Agricultural Research Service

Website: http://sciencepolicy.colorado.edu/sparc/

Staff Highlight

Rad Byerly



Rad used his old Washington, D.C. connections and considerable powers of persuasion to convince six past Science Advisors to the U.S. President ranging back in time to the Johnson administration to participate in our "Policy, Politics and Science at the White House: Conversations with Presidential Science Advisors" series. On October 26 he gave a talk to the NRC Climate Research Committee's Forum on Characterizing and Communicating Climate Change Uncertainties titled "Decision Making Under Climate Change Uncertainty." Rad also advises graduate students on their research and careers.

Scales of Decision Making and the Carbon Cycle (Dilling)

The Carbon Cycle Science Plan and North American Carbon Plan both aim to provide carbon cycle information that will support decision making at a variety of scales, but do not define how the scientifically defined strategy to link across scales will intersect with scales of decision-making. This project will study the institutions whose practices and policies influence the biospheric portion of the carbon cycle in two U.S. states—Colorado and Pennsylvania—to create a matrix of decision-making at Federal, regional and local levels that affects carbon storage and release land that will be mapped onto the scales at which usable scientific knowledge of policy-relevant carbon exchange processes is organized. It will compare these results to scales of land use patterns and resulting carbon uptake and release patterns to understand how scales of decision-making intersect with biogeophysical scales. This study will be the first step in understanding how decisions made in institutions at different scales currently act to affect carbon sequestration.

Project activities this year

Dilling presented research on directions for understanding scales of decision making and their influence on the carbon cycle in a talk at the American Association of Geographer's Meeting, Denver, CO April 2005 (talk entitled: Toward Carbon Governance: Challenges for science and policy across scales). A paper based on this talk is in preparation.

Website: http://sciencepolicy.colorado.edu/homepages/lisa_dilling/ccycledecisions/

State of the Carbon Cycle Report (Dilling)

The **State of the Carbon Cycle Report** is a broadly conceived activity "designed to provide accurate, unbiased, and policy-relevant scientific information concerning the carbon cycle to a broad range of stakeholders." The two overarching objectives for the SOCCR are to summarize scientific knowledge about carbon cycle properties and changes, and to provide scientific information for decision support and policy formulation concerning carbon.

Project activities this year

- **Workshops**

  Dilling co-convened two workshops for SOCCR/SAP 2.2, one for Stakeholders of the SOCCR, and one for lead authors.

- **Website**

  Dilling managed development of the SOCCR website and ongoing maintenance of the site.

- **Authorship**

  Dilling co-managed selection and recruitment of over 20 authors from three countries to participate in the SOCCR.

- **Publicity**

  Dilling was the co-convenor of AGU town hall, administrator of SOCCR listserv, developed SOCCR brochure.

- **Stakeholder interaction**

  Dilling acts as liaison and co-manager of SOCCR stakeholder process, including targeted stakeholder assessment conducted by Consensus Building Institute, stakeholder workshop, and public/stakeholder comments and responses.

- **Leadership**

  Dilling is co-leader of SOCCR/SAP 2.2 process, responsible for progress, interaction with agencies, authors, stakeholders and broader community, budget formulation and management, outline and document development.

- **Chapter Lead Author**

  Dilling will co-author SOCCR chapter V: How can we improve the application of scientific information to decision support for carbon management and climate decision-making?

Website: http://www.isse.ucar.edu/soccr/

Climate Change: Communicating Urgency/Facilitating Social Change (Dilling)

Lisa Dilling continued to participate in this project that was launched while she was a scientist at the National Center for Atmospheric Research. The project focuses on how to improve climate change communication in a way that helps facilitate individual and organizational/institutional change toward more environmentally sustainable behavior.

Project activities this year

- **Publications**

  Moser, S. and Dilling, L., Eds. Beyond Message: Communicating climate change—Facilitating social change. Approximately 40 chapters from a variety of contributors. Currently under consideration at Island Press (package submitted June 2005).

  Dilling, L. with Moser, S. Introduction. In: Beyond Message: Communicating climate change—Facilitating social change.

  Dilling, L. with Farhar, B. Making it Easy: Institutionalizing energy efficiency and renewable energy into everyday consumer practice. In: Beyond Message: Communicating climate change—Facilitating social change.

Website: http://www.isse.ucar.edu/changeworkshop/index.html

Lessons in Technology Transfer Policy for the Atmospheric Sciences: A case study in Public-Private-Academic Partnership on Level II Radar Data (Gratz, Pielke)

ENVS/MBA and Center graduate student Joel Gratz received a one-year grant from the National Weather Service to evaluate the policy processes and outcomes related to the partnership on Level II radar data as part of his Masters thesis. Level II data is the highest quality data available from government-owned weather radars across the country. For nearly seven years after first installing these radars, the government and users of this data did not collaborate on any archival or real-time data dissemination system. Beginning in 2004 after another six years of development, a new data archival and dissemination system became operational to the delight of the government and most academic and commercial users. Gratz's thesis will focus on the lessons learned concerning the structure of distributing federally funded data. Is the current Level II system the best system? Does it serve the needs of all users? Did the meteorological community need to wait seven years after radar installation to begin serious action on a robust data dissemination system? This evaluation has considerable potential to contribute useful knowledge to the NWS on its continuing development and implementation of partnership policies, as well as broader lessons in technology policy to government, academic, and private sectors.

Website: http://sciencepolicy.colorado.edu/homepages/joel_gratz/lttpas/index.html

ONGOING RESEARCH PROJECTS

Carbon Cycle Science: Reconciling Supply and Demand (Pielke)

This project is a collaborative activity of Arizona State University's Consortium for Science, Policy and Outcomes, the Center, and the Natural Resources Ecology Laboratory at Colorado State University. It focuses on understanding the supply of and demand for carbon cycle science information, and the development of an interdisciplinary research agenda to reconcile supply and demand.

Project activities this year

On September 16-17, 2004 the project convened a workshop to discuss reconciling supply of and demand for carbon cycle science. Participants included carbon cycle scientists, program managers, social and policy scientists, people who make decisions implicated by carbon cycle science, as well as a number of graduate students. The workshop focused on characterizing supply, understanding demand, and learning lessons from other areas of research where RSD has been an important component of science policy (e.g., seasonal climate forecasting). Three cases were used to explore RSD in some detail: agro-ecosystems, the urban setting, and an international case study focused on the Large-Scale Biosphere Atmosphere Program in the Amazon. Several papers were produced for the workshop; they are under revision:

- Reconciling Supply and Demand for Science with Science Policy - Daniel Sarewitz and Roger Pielke, Jr.
- Reconciling Supply and Demand of Scientific Information: A Review of Literature - Elizabeth McNie
- The Supply-Side of U.S. Carbon Cycle Science - Lisa Dilling
- Supply and Demand for Carbon Cycle Science Related to Agriculture - Richard T. Conant
- Cities, Consumers, and the Global Carbon Cycle Background Paper - Robert Harriss, Michele Betsill, Shui Bin, and Sharon Shearer
- Science and Brazilian Environmental Policy: The Case of the LBA and Carbon Sink Science - Myanna Lahsen

In addition, a workshop report was produced which is available here (http://sciencepolicy.colorado.edu/carboncycle/reconciling/).

Website: http://sciencepolicy.colorado.edu/carboncycle/

Climate Services Clearinghouse (Pielke, Maricle)

A clear gap has emerged between the climate information needs of society and the scientific research meant to fill those needs. Climate information has indeed become ever better, but many people in the field -- from farmers to water managers to clothing store owners -- don't know how to find or use the results of climate research in their planning. Climate services attempt to close the gap between the providers and the potential users of climate information by offering climate information to businesses and communities that want to better plan, adjust, and adapt to climatic variability.

The Climate Services Clearinghouse is a one-stop shopping website that draws together climate services and products across sectors, from NOAA, non-NOAA government agencies, academia, and the private sector. It enables providers to identify and fix overlap and gaps in existing services and also enables site visitors to locate any service of interest.

Project activities this year

Over the past year efforts have been focused in four main areas: site maintenance, site function, publicity, and partnerships.

At the beginning of FY05 the project submitted a proposal to the NOAA OGP National Climate Transition Program. While the proposal was not successful this year it paved the way for a partnership with NOAA's Climate Services Division (CSD). CSD director Bob Livezey offered high praise for the CSC and suggested that it contribute to NOAA's next generation of climate services infrastructure. He agreed to transition the CSC to his office – and the NWS homepage - for continued implementation once it has reached maturity. Because of this commitment, plans are now underway to complete and transfer the CSC to NWS by December 2006.

In addition to those efforts, undergraduate Environmental Studies student Megan Emmett has worked all year updating and standardizing the site. Center webmaster Mark Lohaus has instituted changes to increase the usability of the search functions to make the site easier and more logical to navigate.

Finally, we have actively publicized the website through presentations in several settings (see list of conference presentations below). From this, we've gotten valuable feedback from potential site users in several sectors and larger numbers of visits to the site.

Staff Highlight
Martyn Clark

Martyn has been working over the last year on developing new probabilistic methods for streamflow forecasting for use in NWS operations. His focus has been on methods to characterize and reduce errors in model simulations of the mountain snowpack. These methods will ultimately improve streamflow forecasts in the snow-fed river basins in the Intermountain West. Martyn is a co-organizer of an international workshop on hydrologic ensemble prediction (http://www.mmm.ucar.edu/events/hepex05/index.html) which was held in Boulder, Colorado, in July 2005.

We plan to continue adding to the site through conference attendance, web searches, and a listserv of service providers over the course of the next year. We will also launch our new search function in the next few months, which we'll follow with intensive usability studies. Finally, we will begin to transition the CSC to the CSD at NOAA. To do this, we will create a handbook for updating and maintaining the site.

– **Presentations (all by Genevieve Maricle)**

- Western Water Assessment Project Update Meeting, October 2004, Boulder, CO
- American Meteorological Society Annual Meeting, January 2005, San Diego, CA
- Western Water Assessment/Denver Water Meeting, January 2005, Boulder, CO
- Science and Decision Making Symposium, February 2005, Boulder, CO
- Climate Prediction Applications Science Workshop, March 2005, Palisades, NY
- AAAS Graduate Student Conference on Science and Technology in Society, April 2005, Washington, DC
- American Meteorological Society Applied Climatology Meeting, June 2005, Savannah, GA

Website: http://sciencepolicy.colorado.edu/climateservices/

Hydro-climate Research and Decision Making (Clark, Rajagopalan)

The central theme of Hydro-Climate Research and Decision Making is to advance hydro-climate research to meet the decision-making needs of water managers in different parts of the country. Research is directed toward improving operational hydrologic forecasting capabilities, and is focused on all aspects of the operational hydrologic forecast system. The three system components are:

1) Inputs: develop skillful local scale forecasts of precipitation and temperature ranging from lead-times of days to seasons, for use in hydrologic forecast models.
2) Process: study basin initial conditions and characterize model uncertainties.
3) Outputs: post-processing model outputs to provide improved model simulations.

The project is currently working with the NWS Office of Hydrologic Development to infuse its forecasting techniques in the NWS operations. The methods developed in this project are resulting in tangible increases in forecast skill, in both experimental and operational applications. Other research has focused on improving estimates of basin initial conditions, and addressing parameter and structural issues in hydrologic and land-surface models. Early results indicate that more attention in these areas will result in significant increases in the skill of streamflow forecasts.

Project activities this year

– **Presentations (all by Martyn Clark)**

Science and Decision Making Symposium, Boulder, CO, Feb. 25, 2005: Transfer of Streamflow Forecasting Methods from the Research Community to Operational Agencies.

Western Snow Conference, Great Falls, MT, April, 2005: Hydrologic Applications of Remotely Sensed Snow Information: Challenges and Opportunities.

European Geophysical Union General Assembly, Vienna, Austria, April, 2005: Development of probabilistic streamflow forecasting methods.

– **Refereed Publications**

Clark, M.P. and L.E. Hay (2004): Use of medium-range weather forecasts to produce predictions of streamflow. Journal of Hydrometeorology, 5, 15-32.

Clark, M.P., S. Gangopadhyay, L.E. Hay, B. Rajagopalan, and R.L. Wilby (2004): The Schaake Shuffle: A method to reconstruct the space-time variability of forecasted precipitation and temperature fields. Journal of

Hydrometeorology, 5, 243-262.

Clark, M.P., S. Gangopadhyay, D. Brandon, K. Werner, L.E. Hay, B. Rajagopalan, and D. Yates (2004): A resampling procedure for generating conditioned daily weather sequences. Water Resources Research, Vol. 40, No. 4, W04304 10.1029/2003WR002747.

Gangopadhyay, S., **M.P. Clark**, B. Rajagopalan, K. Werner, and D. Brandon (2004): Effects of spatial and temporal aggregation on the accuracy of statistically downscaled precipitation estimates in the Upper Colorado River basin. Journal of Hydrometeorology, 5, 1192-1206.

Saunders, J.F., M. Murphy, **M.P. Clark**, and W.M. Lewis (2004): The influence of climate variation on the estimation of low flows used to protect water quality: A nationwide assessment. Journal of the American Water Resources Association, 40, 1339-1349.

Werner, K., D. Brandon, **M.P. Clark**, and S. Gangopadhyay (2004): An evaluation of approaches for using climate indices for seasonal volume forecasting with the ensemble streamflow prediction system of the NWS. Journal of Hydrometeorology, 5, 1076-1090.

Gangopadhyay, S., **M.P. Clark**, and B. Rajagopalan (2005): Statistical downscaling using k-nearest neighbors. Water Resources Research, 41,2, W02024, 10.1029/2004WR003444.

Mote P.W., A.F. Hamlet, **M.P. Clark**, and D.P. Lettenmaier (2005): Declining mountain snowpack in western North America. Bulletin of the American Meteorological Society, 86, 39-49.

Rajagopalan, B., K Grantz, S. Regonda, **M.P. Clark**, and E. Zagona (2005): Ensemble streamflow forecasting : Methods and Applications. In Advances in Water Science Methodologies, Ed by U. Aswathanarayana, Taylor and Francis, Netherlands.

Regonda, S., B. Rajagopalan, **M.P. Clark**, and J. Pitlick (2005): Seasonal cycle shifts in Hydroclimatology over the western United States. Journal of Climate, 18, 372-384.

Regonda, S., B. Rajagopalan, U. Lall, **M.P. Clark**, and Y. Moon (2005): Local polynomial method for ensemble forecast of time series, Nonlinear Processes in Geophysics, 12, 397-406.

Singhrattna, N., B. Rajagopalan, **M.P. Clark** and K. Krishna Kumar (2005): Forecasting Thailand Summer Monsoon Rainfall. International Journal of Climatology, 25, 649-664.

Werner, K., D. Brandon, **M.P. Clark**, and S. Gangopadhyay (2005): Incorporating Medium-Range Numerical Weather Prediction Model Output into the Ensemble Streamflow Prediction System of the National Weather Service. Journal of Hydrometeorology, 6, 101-114.

- **Publications in press**

Clark, M.P., and A.G. Slater (2005): Probabilistic quantitative precipitation estimation in complex terrain. Journal of Hydrometeorology, in press.

Grantz, K., B. Rajagopalan, **M.P. Clark**, and E. Zagona (2005): A technique for incorporating large-scale climate information in basin-scale streamflow forecasts. Water Resources Research, in press.

Hamlet A.F., P.W. Mote, **M.P. Clark**, and D.P. Lettenmaier (2005): Effects of temperature and precipitation variability on snowpack trends in the western U.S. Journal of Climate, in press.

McCabe, G.J., and **M.P. Clark** (2005): Trends and variability in snowmelt runoff in the western United States, Journal of Hydrometeorology, in press.

Singhrattna, N., B. Rajagopalan, K. Krishna Kumar and **M.P. Clark** (2005): Interannual and Interdecadal Variability of Thailand Summer Monsoon. Journal of Climate, in press.

- **Publications under review**

  Clark, M.P., A.G. Slater, A.P. Barrett, B. Rajagopalan, G.J. McCabe, L.E. Hay, and George H. Leavesley: Assimilation of snow covered area information into hydrologic and land-surface models. Paper submitted to Advances in Water Research.

  Hamlet A.F., P.W. Mote, **M.P. Clark**, and D.P. Lettenmaier: 20th Century Trends in Runoff, Evapotranspiration, and Soil Moisture in the Western U.S. Paper submitted to the Journal of Climate

  Hay, L.E., **M.P. Clark**, M. Pagowski, G.H. Leavesley, and W.J. Gutowski, Jr.: One-way Coupling of an Atmospheric and a Hydrologic Model in Colorado. Paper submitted to the Journal of Hydrometeorology.

  Hay, L.E., G.H. Leavesley, **M.P. Clark**, S.L. Markstrom, R.J. Viger, and M. Umemoto: A Multi-Objective, Step-Wise, Automated Calibration Approach Applied to Hydrologic Modeling of a Snowmelt-Dominated Basin in Colorado. Paper submitted to the Journal of the American Water Resources Association.

  Hwang, Y., **M.P. Clark**, B. Rajagopalan, S. Gangopadhyay, and L.E. Hay: Inter-comparison of spatial estimation schemes for precipitation and temperature. Paper submitted to Water Resources Research.

  Gangopadhyay, S., S. Apipattanavis, B. Rajagopalan, U. Lall and **M.P. Clark**: Annual Cycle Variability of Precipitation, Temperature and Streamflow in the Western United States. Paper submitted to the Journal of Climate.

  McCabe, G.J., and **M.P. Clark**: Changing co-variability of summer monsoon precipitation with winter precipitation in the southwestern United States. Paper submitted to the Journal of Hydrometeorology.

  Slater, A.G., and **M.P. Clark**: Snow data assimilation via an ensemble Kalman filter. Paper submitted to Journal of Hydrometeorology.

Website: http://sciencepolicy.colorado.edu/hydroclimate/

"'Our' Science, 'Their' Science – The role of territory and translocality in competing scientific understandings of Amazonia's role in the global carbon cycle." (Lahsen)

This project involves empirical study of scientists' competing scientific hypotheses related to the role of the Amazon in the global carbon cycle and hence in human-induced climate change. In particular, the project is designed to reveal socio-political patterns among differences in positions on the issue among scientists from Brazil, the U.S. and Europe, and the extent to which these patterns do or do not map on to traditional territorial boundaries.

Project activities this year

- **Presentations**

  Lahsen, M., 2004. Presentation to an audience of science policy analysts and students, agricultural experts, scientists and social scientists. Carbon Cycle Science workshop, Colorado State University, Ft. Collins, CO. September.

  Lahsen., M. Presentation to an audience of geographers at the University of Colorado, Boulder, CO.

  Lahsen, M., 2005. "Scientific Knowledge Construction and Representation: The Need for 2nd Wave Scientific Literacy," 4th Science Center World Congress, Rio de Janeiro, Brazil, 14 April.

  Lahsen, M., 2005. "Brazilian Sovereignty and Struggles with Science." Science and Democracy Network Annual Meeting, Harvard University, 24 June.

- **Publications**

  Myanna Lahsen, International Science, National Policy: The Politics of Carbon Cycle Science in Brazil, Climatic Change (submitted).

Myanna Lahsen and Carlos A. Nobre, Evaluating the Large-Scale Biosphere Atmosphere (LBA) Experiment: The Challenges of Connecting International Science and Local Level Sustainability, Environmental Science and Policy (manuscript in progress).

Myanna Lahsen, Relationships in Tension: International Science, the Global Environment and National Sovereignty - The Case of Climate Science in Brazil , bibl. journal manuscript being expanded into book manuscript (work in progress).

Myanna Lahsen, Transnational Locals: Brazilian Scientists in the Climate Regime, bibl., (2004). Book chapter Published in Collection: Sheila Jasanoff and Marybeth Long-Martello, Earthly Politics, Worldly Knowledge: Local and Global in Environmental Politics (MIT Press).

Myanna Lahsen, Report: The Role of Unstated Mistrust and Disparities in Scientific Capacity. Report to Swedish Institute for Climate Science and Policy Research.

Website: http://sciencepolicy.colorado.edu/our_science_their_science/

Western Water Assessment (Udall)

Western Water Assessment

Using multidisciplinary teams of experts in climate, water, law, and economics, the Western Water Assessment provides information about natural climate variability and human-caused climate change. This information - usually in the form of climate forecasts and regional vulnerability assessments -- is designed to assist water-resource decision makers such as Denver Water.

Some recent Western Water Assessment projects have:

1) provided experimental 90-day climate outlooks to the Colorado Water Availability ("Drought") Task Force;

2) generated 500-year tree-ring based historical streamflows for use by large Front Range water providers to evaluate vulnerability to drought;

3) improved springtime streamflow runoff forecasts issued by the National Weather Service for use by reservoir managers such as the Bureau of Reclamation;

4) constructed a model of the South Platte River to look at the long term effects of climate variability and population growth on water supplies; and

5) constructed new climate divisions for use by the NWS Climate Prediction Center and local weather forecast offices.

WWA was relocated out of the Center in March to sit as an independent project within CIRES.

Website: http://sciencepolicy.colorado.edu/wwa/index.html

Staff Highlight
Lisa Dilling

As a co-leader of the State of the Carbon Cycle Report, slated to be one of the synthesis and assessment products of the Climate Change Science Plan, Lisa is working right at the intersection of science, policy and "usable science." At a recent workshop she organized, she brought together carbon cycle scientists, science policy decision makers, researchers of science policy and experts in user-climate science interactions to provide practical knowledge on how to design a "usable" carbon science program—filling a gap in the current research agenda. Lisa also serves as the Director of the Center's SPARC project.

Education

Graduate Certificate Program in Science and Technology Policy

The certificate is a rigorous educational program to prepare students pursuing graduate degrees for careers at the interface of science, technology, and decision making. Upon completion of the certificate program 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 has grown from its initial cohort of ten students to its current enrollment of 20 graduate students representing the following University of Colorado departments and programs: Communication, Chemical Engineering, Computer Science, Electrical Engineering, Environmental Studies, Mechanical Engineering, Optical Engineering, Political Science, Psychology, National Snow and Ice Data Center, and World Data Center for Glaciology.

Website: http://sciencepolicy.colorado.edu/stcert/

Students at the Center

The Center fulfills one of its primary purposes – education – through the active involvement of CU graduate students. The following graduate students worked with the Center over the past year. Their research interests are indicated.


Marilyn Averill

- **Marilyn Averill** (Ph.D. candidate, Environmental Studies) - international environmental governance, the politics of science, and science and technology policy, particularly in the context of global climate change.


Joel Gratz

- **Adam Briggle** (Ph.D. candidate, Environmental Studies) - Adam's dissertation focuses on the contrast between modernity and "non-modernity" using The President's Council on Bioethics as a way to empirically ground his work. Adam hopes to shed insight on four areas: public decision making about science and technology, nature, values, and humanities scholarship.
- **Joel Gratz** (joint M.B.A./M.S. student, Environmental Studies) - Joel's thesis research will look at the collaboration between the public, private, and academic sectors in their reach to develop the best system to disseminate Level II radar information. Joel, Erik Noble, and MBA student Ryan Church prepared a report on Lightning, Outdoor Stadiums, and Spectator Safety (http://sciencepolicy.colorado.edu/~ami/annextra/Joel%20Gratz%20presentation.pdf) that assessed various policy alternatives for large outdoor stadiums to protect spectators from lightning strikes.


Nat Logar

- **Yeonsang Hwang** (Ph.D. candidate, Civil Engineering) - water resources, Western Water Assessment.
- **Nat Logar** (Ph.D. candidate, Environmental Studies) - Nat's research focuses on the decision support goals of the USDA's Agricultural Research Program, including its prioritization of global change science and the transfer of scientific information to meet decision maker needs.
- **Genevieve Maricle** (Ph.D. candidate, Environmental Studies) - Genevieve's research focuses on climate services and the transfer of technology from climate research to useful weather and climate products for both decision-makers and climate-sensitive end users. She directs the Climate Services Clearinghouse.


Elizabeth McNie

- **Elizabeth McNie** (Ph.D. candidate, Environmental Studies) - Elizabeth's research focuses on science policy as it relates to environmental issues such as global climate change and ocean policy.
- **Shali Mohleji** (Ph.D. candidate, Environmental Studies) - connecting the atmospheric sciences and policy fields.

- **Erik Noble** (Ph.D. candidate, Environmental Studies) - meteorology and policy.
- **Tind Shepper Ryen** (Ph.D. candidate, Environmental Studies) - space policy, energy policy, federal R&D.


Shep Ryen

Graduate Student Internships

- **Shep Ryen**, House Science Committee
- **Shali Moleji**, Office of Management and Budget
- **Brian Schwartz** (Science and Technology Policy Certificate Student), National Academy of Sciences


Sally Dowlatshahi

The Center also employs other graduate and undergraduate students to assist with vital Center functions.

- **Jessac Baird** - undergraduate in Computer Science and Philosophy who assisted the Center's webmaster
- **Soumya Chennapragada** - masters candidate in Civil Engineering working with Martyn Clark
- **Sally Dowlatshahi** - Ph.D. candidate in Electrical Engineering who worked with the SPARC project on web development
- **Megan Emmett** - undergraduate in Environmental Studies and Studio Arts who is assisting with the Climate Services Clearinghouse project
- **Jonathan Holen** - undergraduate in Political Science and Philosophy who provides general office assistance


Megan Emmett

COURSES TAUGHT BY CENTER STAFF

– **ENVS 5000 - Policy, Science, and the Environment** (Roger Pielke, Jr.)

The goals of this course were to discuss issues arising at the intersection of policy, science and the environment that create challenges for effective decision making; to introduce students to conceptual tools which are useful in thinking more effectively and responsibly about any problem of policy; and to develop and practice skills using the tools to analyze the various dimensions of a issue of environmental policy.

– **ENVS 5100 - Science and Technology Policy** (Roger Pielke, Jr.)

An introduction to science and technology policy research that sets the stage for improved understandings of science and technology, and their broader outcomes in society. It is the first in a 3-course sequence within the Graduate Certificate Program in Science and Technology Policy.

– **ENVS 5120/MCEN 6228-002 - Quantitative Methods of Policy Analysis** (Roger Pielke, Jr., Jana Milford)

An introduction to graduate students in engineering, environmental studies, science and technology policy, and other fields to the quantitative tools used for decision-making under uncertainty in policy analysis and technology management. Students learned how to apply these methods, select analytical tools that are appropriate for a given situation, and critically evaluate the results of analyses performed with each method.

Outreach

The Center's outreach disseminates research and ideas through publications in both peer-reviewed and non-peer-reviewed journals, talks and presentations by Center staff and students as well as by visitors to the Center or sponsored by the Center, a newsletter (Ogmius), a website, a weblog (Prometheus), and extensive media coverage.

What's New

Policy, Politics and Science in the White House: Conversations with Presidential Science Advisors

(Klein, Pielke, Byerly)

The Center launched this series featuring current and former presidential science advisors to gain perspective on the role of science in policy and politics at the highest levels of government. Each presidential science advisor participates in a two-day visit to Boulder consisting of meetings with graduate students, Center staff, CU faculty and officials, and local scientists. The visits culminate in a public forum during which the advisor engages in a dialogue with Roger Pielke and the audience about a significant science policy issue or issues that arose during his tenure. Hundreds of people have participated in the series through these meetings and the public forums.

During the spring 2005 semester the following science advisors participated in the series:

- **February 14 - John Marburger** (advisor to President G.W. Bush)
- **April 28 - Dr. John Gibbons** (advisor to President Clinton 1993-98)

The series also included an April 18 talk by Dr. Robert Palmer, former Democratic Chief of Staff for the House Science Committee, providing a "view from the Hill."

Dr. John Marburger gives a presentation at CU

The series will continue in the fall and Winter with the following talks on the CU-Boulder campus:

- **September 12, 2005 - Dr. Edward David** (science advisor to Richard Nixon 1970-73)
- **October 5, 2005- Dr. Neal Lane** (science advisor to Bill Clinton 1998-2001)
- **October 24, 2005 - Dr. Donald Hornig** (science advisor to Lyndon Johnson 1963-69)
- **January 31, 2006 - Dr. George Keyworth** (science advisor to Ronald Reagan 1981-86)

Website: http://sciencepolicy.colorado.edu/scienceadvisors/. The website includes transcripts, audio recordings, and streaming video from each talk. Additionally, Boulder's Municipal Cable Channel 8 broadcasts each talk on a monthly basis.

Science, Technology, and Decision Making Symposium

Science, Technology and Decision Making Symposium

On February 25 the Center organized this public symposium to showcase to the University of Colorado and Boulder communities activities at the Center and CU relating to science, technology, and decision making. The symposium included the following sessions:

- Striking Back! Protecting Spectators from Lightning in Large Stadiums by **Joel Gratz**
- Changing the Climate on Climate by **Susan Avery**
- Does Water Flow towards Money or Downhill? Lessons from the Western Water Assessment by **Brad Udall**
- Assessing the Effectiveness of Lawn Watering Restrictions During the Drought of 2002 by **Doug Kenney**

- Transfer of forecasting methods from the research community to operational agencies: Lessons learned by **Martyn Clark**
- Climate Change and Regional Heat waves: Policy Implications by **Tom Chase**
- One-Stop Shopping for Usable Science: The Case of Climate Information by **Genevieve Maricle**
- Incorporating Large-Scale Climate Information in Water Resources Decision Making by **Balaji Rajagopalan**
- Science and Security in the Age of Bioterrorism by **Lisa Keranen**
- Decision structures for the new nuclear era by **Jerry Peterson**
- The Impact of Frequency Agile Radio Communications on Spectrum Policy by **Doug Sicker**
- Implications of Go-as-You-Pay for the Bush Space Vision by **Shep Ryen**
- Presidential Science Advisor Lecture Series by **Bobbie Klein**
- Journalism Values vs. Science Values: an uneasy match by **Tom Yulsman**
- From Linear Model to Pasteur's Quadrant by **Elizabeth McNie**
- In search of Pasteur's Quadrant: Opportunities and barriers in incorporating considerations of use in carbon cycle science research by **Lisa Dilling**

Website: http://sciencepolicy.colorado.edu/events/st_decision_symposium/ (Powerpoint presentations given at the forum are available at this site).

2004-05 Publications

- Clark, M.P., L. Hay, A. Slater, K. Werner, D. Brandon, A. Barrett, S. Gangopadhyay, and B. Rajagopalan, 2004. Ensemble Streamflow Forecasting in Snowmelt Dominated River Basins. GEWEX News, p. 4-6, August.
- Downton, M., J. Z. B. Miller, and R.A. Pielke, Jr., 2005. Reanalysis of U.S. National Weather Service Flood Loss Database. Natural Hazards Review, Vol. 6, pp.13-22.
- Downton, M. and R.A. Pielke, Jr., 2005. How Accurate are Disaster Loss Data? The Case of U.S. Flood Damage. Natural Hazards, Vol. 35, No. 2, pp. 211-228.
- Gangopadhyay, S., M.P. Clark, B. Rajagopalan, K. Werner, and D. Brandon, 2004. Effects of spatial and temporal aggregation on the accuracy of statistically downscaled precipitation estimates in the Upper Colorado River basin. Journal of Hydrometeorology, Vol. 5, pp. 1192-1206.
- Gangopadhyay, S., M.P. Clark, and B. Rajagopalan, 2005. Statistical downscaling using k-nearest neighbors. Water Resources Research, 41,2, W02024, 10.1029/2004WR003444.
- Gratz, J., 2004. Vorticity or Veteran's Affairs? The Washington, D.C. Perspective on Meteorology from the Eyes of a Graduate Student. Bulletin of American Meteorological Society, Vol. 85, No. 11, November.

Staff Highlight
Bobbie Klein

Bobbie was instrumental in conceiving of, organizing, and managing the Center's "Policy, Politics and Science at the White House: Conversations with Presidential Science Advisors" series over the past year. She has also continued her research on the municipal response to drought with a study of drought planning by 29 municipal water providers across Colorado's Front Range. Bobbie has played a significant role in every Center activity since its inception.

- Gratz, J., R. Church, and E. Noble, 2005. Safeguarding the Spectator. Weatherwise, January/February, pp. 42-45.
- Klein, R. and B. Udall, 2004. 2008 Colorado Drought Impact Report: A Report to the Governor. Natural Hazards Observer, Vol. 28, No. 6, July, pp. 5-6 (invited article in "Disasters Waiting to Happen" series).
- Moser, S. and L. Dilling, 2004. Making Climate Hot: Communicating The Urgency And Challenge Of Global Climate Change. Environment, Volume 26, No. 10, pp. 32-46.
- Mote P.W., A.F. Hamlet, M.P. Clark, and D.P. Lettenmaier, 2005. Declining mountain snowpack in western North America. Bulletin of the American Meteorological Society, January, pp. 39-49.
- Pielke, Jr., R.A., 2005. A part of but apart from politics: Can Scientists advise policy-makers without compromising their objectivity? Book Review for Nature's Experts: Science, Politics, and the Environment by Stephen Bocking, Rutger's University Press: 2004, Nature, Vol. 434, pp 139-140.
- Pielke, Jr., R.A., 2005. Accepting politics in science. The Washington Post, 10 January, p. A17.
- Pielke, Jr., R.A., 2005. Consensus about climate change? Science, Vol. 308, pp. 952-953.
- Pielke, Jr., R.A., 2005. Il paradoso di Lomborg e dei suoi nemici (Italian Version). Darwin, January/February, pp. 64-69.
- Pielke, Jr., R.A., 2004. The End of Research? A Perspective for the Consortium for Science, Policy, and Outcomes, http://www.cspo.org, Arizona State University, October.
- Pielke, Jr., R.A., 2004. Forests, Tornadoes, and Abortion: Thinking about Science, Politics and Policy. Chapter 9 in J. Bowersox and K. Arabas (eds.), Forest Futures: Science, Policy and Politics for the Next Century (Rowman and Littlefield), pp. 143-152.
- Pielke, Jr., R.A., 2004. Letter to the editor. The Daily Camera, 9 September.
- Pielke, Jr., R.A., 2004. Making sense of science in the politics of the stem-cell debate. Rocky Mountain News, 31 July.
- Pielke, Jr., R.A., 2004. What is Climate Change? Issues in Science and Technology, Summer, pp. 1-4.
- Pielke, Jr., R.A., 2004. When scientists politicize science: making sense of controversy over The Skeptical Environmentalist. Environmental Science & Policy, Vol. 7, pp. 405-417.
- Pielke, Jr., R.A. and R. Klein, 2005. Distinguishing Tropical Cyclone-Related Flooding in U.S. Presidential Disaster Declarations: 1965-1997. Natural Hazards Review, May, pp. 55-59.
- Pielke, Jr., R.A. and D. Sarewitz, 2005. Bringing Society back into the Climate Debate. Population and Environment, Volume 26, Number 3, pp. 255-268.
- Pielke, Jr., R.A., and S. Rayner, 2004. Editorial: Editors' Introduction. Environmental Science & Policy, Vol. 7, pp. 355-356.
- Rajagopalan, B., K. Grantz, S. Regonda, M.P. Clark, and E. Zagona, 2005. Ensemble streamflow forecasting: Methods and Applications. In Advances in Water Science Methodologies, U. Aswathanarayana, Taylor and Francis (eds.), Netherlands.
- Regonda, S., B. Rajagopalan, U. Lall, M.P. Clark, and Y. Moon, 2005. Local polynomial method for ensemble forecast of time series. Nonlinear Processes in Geophysics, Vol. 12, pp. 397-406.
- Regonda, S., B. Rajagopalan, M.P. Clark, and J. Pitlick, 2005. Seasonal Cycle Shifts in Hydroclimatology over the Western United States. Journal of Climate, Vol. 18, pp.372-384.
- Sarewitz, D. and R.A. Pielke, Jr., 2005. Rising Tide. The New Republic, 6 January.

- Saunders, J.F., M. Murphy, M.P. Clark, and W.M. Lewis, 2004. The influence of climate variation on the estimation of low flows used to protect water quality: A nationwide assessment. Journal of the American Water Resources Association, Vol. 40, pp. 1339-1349.
- Singhrattna, N., B. Rajagopalan, M.P. Clark, and K. Krishna Kumar, 2005. Forecasting Thailand Summer Monsoon Rainfall. International Journal of Climatology, Vol. 25, pp. 649-664.
- Werner, K., D. Brandon, M.P. Clark, and S. Gangopadhyay, 2004. An evaluation of approaches for using climate indices for seasonal volume forecasting with the ensemble streamflow prediction system of the NWS. Journal of Hydrometeorology, Vol. 5, pp. 1076-1090.
- Werner, K., D. Brandon, M.P. Clark, and S. Gangopadhyay, 2005. Incorporating Medium-Range Numerical Weather Prediction Model Output into the Ensemble Streamflow Prediction System of the National Weather Service. Journal of Hydrometeorology, Vol. 6, pp. 101-114.

A complete list of all Center publications and links to many of those publications can be found at the Center's publications page, http://sciencepolicy.colorado.edu/publications/.

Talks and Presentations

Center Affiliate, Tom Yulsman giving a talk at the Center

Center staff and students give presentations about their research and topics of interest to the science and technology policy community in the U.S. and abroad. The Center also sponsors talks at the University of Colorado, brings speakers and visitors to the Center, and hosts a Noontime Seminar Series which is an opportunity for Center staff, students, and affiliates to present and discuss their work in an informal setting. The Speakers page (http://sciencepolicy.colorado.edu/outreach/center_talks.html) contains a list of all talks given at or sponsored by the Center. When available, Powerpoint presentations and other materials are posted on the Speakers page.

Staff Presentations

- **Martyn Clark**

  Clark, M., 2005. Transfer of Streamflow Forecasting Methods from the Research Community to Operational Agencies. Science and Decision Making Symposium, Boulder, CO, 25 February.

  Clark, M., 2005. Hydrologic Applications of Remotely Sensed Snow Information: Challenges and Opportunities. Western Snow Conference, Great Falls, MT, April.

  Clark, M., 2005. Development of probabilistic streamflow forecasting method. European Geophysical Union General Assembly, Vienna, Austria, April.

- **Lisa Dilling**

  Dilling L, Pielke Jr, R.A., and Sarewitz, D., 2004. Pilot study on reconciling supply and demand: Who are the consumers of information on the North American carbon balance? American Geophysical Union 2004 Fall Meeting.

  Dilling, L. and Moser, S., 2004. Making Climate Hot: Communicating the urgency and challenge of climate change. American Geophysical Union 2004 Fall Meeting.

  Dilling L., 2005. In Search of Pasteur's Quadrant: Use-inspired Carbon Cycle Science. Science and Technology Decision Making Symposium, 25 February, Boulder, CO.

  Dilling L., 2005. Toward carbon governance: Challenges for science and policy across scales. Association of American Geographers, 2005 Annual Meeting.

  Dilling, L., 2005. Overview of SOCCR Mandate and Process. 1st SOCCR Authors workshop, Atlanta, GA May.

Moser, S. (Given by Dilling, L.), 2005. North to the Future: Communicating to and from the Arctic Front Lines of Climate Change. Arctic Research Council of the United States: 2005 Arctic Forum.

Dilling, L., 2005. Carbon and Climate: Challenges and Opportunities. Cherry Creek Challenge School Invited Speaker, 3 June.

Dilling, L., 2005. Introduction, challenge, and charge to the workshop, Decision Support and Carbon Cycle Science. University of Colorado, Boulder, CO, 13-14 June.

Dilling, L., 2005. Invited Presentation: Usable Carbon Cycle Science: Exploring the nexus of carbon cycle science and management at different scales. International Postdoctoral Scientist Network for Earth Systems Science, Breckenridge, CO, 23-25 June.

- **Roger Pielke**

Pielke, Jr., R.A., 2005. Climate Change and Disaster Trends: What Are the Facts? Reinsurance Association of America, Current Events Forum, Philadelphia, PA, 26 May.

Pielke, Jr., R.A., 2005. Beyond Global Warming: Yes or No? Some New Story Ideas on Climate Change. Scripps Institute on the Environment, Center for Environmental Journalism, University of Colorado, Boulder, CO, 19 May.

Pielke, Jr., R.A., 2005. Decisions as a Focus of a Philosophy of Science Policy. Workshop on Philosophy of Science Policy, Lancaster University, Lancaster, UK, 5-6 May.

Pielke, Jr., R.A., 2005. The IPCC: Honest Broker or Political Advocate? Tyndall Centre for Climate Change Research, University of East Anglia, Norwich, UK, 3 May.

Pielke, Jr., R.A., 2005. Climate Change and Disasters. Department of Earth System Science, University of California-Irvine, Irvine, CA, 15 April.

Pielke, Jr., R.A., 2005. Dealing With Scientific Uncertainties in Policy Making. Forum on Science Policy and Ethics, University of Washington, Seattle, WA, 8 April.

Pielke, Jr., R.A., 2005. A Perspective on the Politicization of Science. Forum on Science Policy and Ethics, University of Washington, Seattle, WA, 7 April.

Staff Highlight
Myanna Lahsen

Myanna's research over the past year has led to conclusions about science within Brazilian society, summarized in the following passage from an article she recently completed. "Brazilians manifest deep anxieties about the Amazon region, in particular about their ability to protect the region from invasion and exploitation by foreigners. Science figures prominently in these anxieties which pervade Brazilian society and government alike. Attitudes towards science are ambivalent. Science is seen as a means of strengthening and protecting the country. However, it is also in some respects perceived as a means through which national territorial integrity and national interests can be undermined. A sense of invasion through science exists at two levels entailing two different ways of conceiving the relationship between the nation and its science. One level of the perceived invasion – or fear thereof – revolves around the physical presence and surveillance of Brazilian territory on the part of foreign scientists. At this level, national interests, subjects, and science are commonly posited as unified against foreigners, and national scientists are invoked to serve national interests. At another and more subtle level, however, national scientists and their knowledge can themselves be suspect due to their scientific education and practice and the associated inextricable foreign connections."

Pielke, Jr., R.A., 2005. Science Policies and Hurricanes. National Research Council Disasters Roundtable, National Research Council, Washington, DC, 8 March.

Pielke, Jr., R.A., 2005. Beyond Kyoto: A Third Way on Climate Change. U.S. Environmental Protection Agency, Washington, DC, 7 March.

Pielke, Jr., R.A., 2005. Climate Politics and the Destruction of Science. Center for Environmental Journalism, University of Colorado, Boulder, CO, 24 February.

Pielke, Jr., R.A., 2005. Climate Change and Hurricanes. GE Insurance Services Insurance Leadership Institute, Kansas City, KS, 23 February.

Pielke, Jr., R.A., 2005. IPCC: Honest Broker or Political Advocate? Understanding the difference and why it matters, Atlantic Oceanographic and Meteorology Laboratory, National Oceanic and Atmospheric Administration, Miami, FL, 18 February.

Pielke, Jr., R.A., 2005. Introduction to the Policy Sciences. Guest lecture at the University of Miami, course titled "Tools for Environmental Decision Making," Miami, FL, 17 February.

Pielke, Jr., R.A., 2005. Climate Change and Disasters. RSMAS Lecture Series, University of Miami, Miami, FL, 17 February.

Pielke, Jr., R.A., 2005. What we teach about decision making. ICAT Managers, Boulder, CO, 6 January.

Pielke, Jr., R.A., 2004. Congressional Staff Briefing, Climate Change, Extreme Events, and Climate Science Policy. House Committee on Science, Washington, DC, 17 November.

Pielke, Jr., R.A., 2004. Technology Assessment of Observing System Decision Alternatives. National Research Council Workshop on the Future of the Tropical Rainfall Measurement Mission, Washington, DC, 8 November.

Pielke, Jr., R.A., 2004. Improving the Connections of Climate Science and Policy. Hennebach Guest Lecture Series, Colorado School of Mines, Golden, CO, 26 October.

Pielke, Jr., R.A., 2004. SPARC: Science Policy Assessment and Research on Climate. Institute for Behavioral Science, University of Colorado, Boulder, CO, 5 October.

Pielke, Jr., R.A., 2004. Connecting Science and Policy in the IPCC: Beyond Policy Relevant, but not Policy Prescriptive, Mitigation vs. Adaptation: Toward a Mutual Agenda. Kulterwissenshaftliches Institut, Essen, Germany, 25 September.

Pielke, Jr., R.A., 2004. Science, Policy, and Politics: A Perspective on the United States. University of Bielefeld, Bielefeld, Germany, 22 September.

Pielke, Jr., R.A., 2004. Climate Science and Policy in the United States: A Critical Appraisal. Workshop on Climate Science and Policy Beyond 2012, Swedish Institute for Climate Science and Policy, Norrköping, Sweden, 9 August.

Graduate Student Presentations


Adam Briggle

- Adam Briggle presented a paper at the EFS West Sustainability and Higher Education Conference in Portland, Oregon October 21-23 titled "Sustainability as a Human Science." Adam also presented a poster titled "Humanities Policy: Expanding Knowledge for Decision Making."
- Joel Gratz presented his research about lightning and large outdoor stadiums at the Lightning Conference at the AMS Annual Meeting in San Diego in January. Joel and Erik Noble also helped plan and coordinate the 4th Annual Student Conference at the AMS Annual Meeting.
- Joel Gratz spoke at the Center's February 7 noontime seminar about his summer experience working for the University of Colorado's Technology Transfer Office (TTO).
- Genevieve Maricle gave several presentations about the Climate Services Clearinghouse project: Western Water Assessment Project Update Meeting, October 2004, Boulder CO; American Meteorological Society Annual

Meeting, January 2005, San Diego CA; Western Water Assessment/Denver Water Meeting, January 2005, Boulder CO; Science and Decision Making Symposium, February 2005, Boulder CO; Climate Prediction Applications Science Workshop, March 2005, Palisades, NY; AAAS Graduate Student Conference on Science and Technology in Society, April 2005, Washington DC; American Meteorological Society Applied Climatology Meeting, June 2005, Savannah, GA.

- Elizabeth McNie presented a paper titled "Reconciling Supply and Demand of Scientific Information: A Review of Literature" at the September Carbon Cycle Science: Reconciling Supply and Demand Workshop and at the Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainable Development in the Western Hemisphere in Denver, where she also spoke during the closing plenary. She also presented a poster at the AAAS conference in Washington DC.
- Shep Ryen gave a talk at the Center's October 11 Noontime Seminar Series titled "Deciding the fate of the Hubble Space Telescope."

TALKS AT OR SPONSORED BY THE CENTER

Shep Ryen

Noontime Seminar Series

- October 11, Shep Ryen, ENVS graduate student: "Deciding the fate of the Hubble Space Telescope"
- November 8, Bob Frodeman, Department of Philosophy, University of North Texas: "Humanities Policy: What it is, and why it's needed"
- December 6, Tom Yulsman, CU School of Journalism: "What Makes News in Science?"
- February 7, Joel Gratz, ENVS/MBA graduate student: "Commercializing Research: My summer experience at the CU Technology Transfer Office"
- February 28, Anne Ruggles, Visiting Scholar: "Wolf Management in Colorado: The Role of Science in Collaborative Decision Making"
- March 7, Susan Avery, Graduate School Dean and Faculty Affiliate: "Scientists Pushing Back"
- April 4, Frank Laird, Faculty Affiliate: "Learning Complex Lessons: Participation and Electric Utility Regulation"
- April 22, Lisa Keranen, Faculty Affiliate: "Constructing Character in Research Misconduct Controversies"

Occasional Seminars and Other Talks

Craig Roseberry

Mark Leek

The Center occasionally hosts seminars and other talks by people not directly affiliated with the Center:

- September 22, Craig Roseberry, "Army Space Policy: History, Organization, and Future"
- September 23, Mark Leek, security studies, nonproliferation graduate program
- December 7, Martin Parry, co-chair of IPCC WG II, visited the CIRES Policy Center and gave a brief presentation on the current state of IPCC WG II with a follow-up discussion of CU/CIRES connections with the IPCC WG II.
- March 11, Peter Weiss, National Weather Service: "Borders in Cyberspace: Maximizing Social and Economic Benefit from Public Investment in Information"
- March 28, Sarah Michaels, NCAR visiting scientist: "Taking steps towards a multidimensional view of the science-policy interface"

Speakers page website: http://sciencepolicy.colorado.edu/outreach/center_talks.html

Ongoing Outreach Efforts

Ogmius

This past year the Center's newsletter, Ogmius, increased publication from three to four times a year. Each issue features an exchange among or opinion by leading voices in the science and technology policy field on important issues such as cybersecurity policy and the politicization of science. Ogmius also includes Center news and information of interest to the S&T policy field. Current and past issues of Ogmius are available online (http://sciencepolicy.colorado.edu/ogmius/) and in pdf format. Ogmius has subscribers from institutions such as Harvard, Cornell, Stanford, Tufts, the University of Chicago, private industry, USAID, NOAA, AAAS, Red Cross, US Army Corps of Engineers, state agencies in Arizona, Colorado, New York, Texas, Washington, and Wisconsin, as well as from Australia, Canada, India, Japan, New Zealand, and the UK.

Prometheus

PROMETHEUS

In 2004, the Center added Prometheus: The Science Policy Weblog (http://sciencepolicy.colorado.edu/prometheus/) to its outreach efforts. Prometheus began as a class project of the Center's Shep Ryen and was designed to present a forum for science policy news and commentary, as well as public comment and discussion. The site provides a useful service to the science policy community. Prometheus entries have been cited in the Washington Times, EU Reporter, and by UPI. The daily average number of visitors to Prometheus topped 1,000 in May 2005. Topics have included the following:

- Hiding Behind the Science of Stem Cells (May 25)
- The Linear Model of Science in Climate Policy (May 24)
- Is the "Hockey Stick" Debate Relevant to Policy? (May 17)
- Immigration and Climate Change (May 9)
- Leadership in Space (May 2)

Sciencepolicy Website

The Center makes extensive use of the Internet for its outreach activities. Each project listed above has its own unique web page. The following is a sample of additional pages on the site:

– **Speakers page**, http://sciencepolicy.colorado.edu/outreach/center_talks.html

  Provides a list of all past and upcoming speakers, dates and titles of their talks, and presentations, if available.

– **SPGrads**, http://sciencepolicy.colorado.edu/sp_grads/

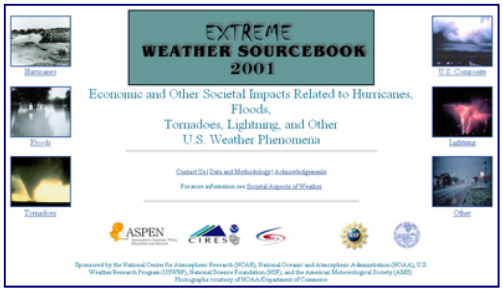
  The SPGrads site is for graduate students and early-career scientists interested in issues of science and technology policy. The site includes the SPGrads listserv, an email forum, and information on past and upcoming events.

- **Science & Technology Jobs**, http://sciencepolicy.colorado.edu/sp_grads/opportunities.html
  This site contains links to pages with science and technology policy jobs, internships, fellowships, etc.
- **Education**, http://sciencepolicy.colorado.edu/education/index.html
  This page provides links to science and technology policy related programs and classes at the University of Colorado and at educational institutions other than the University of Colorado, as well as to science and technology studies programs.

Staff Highlight
Mark Lohaus

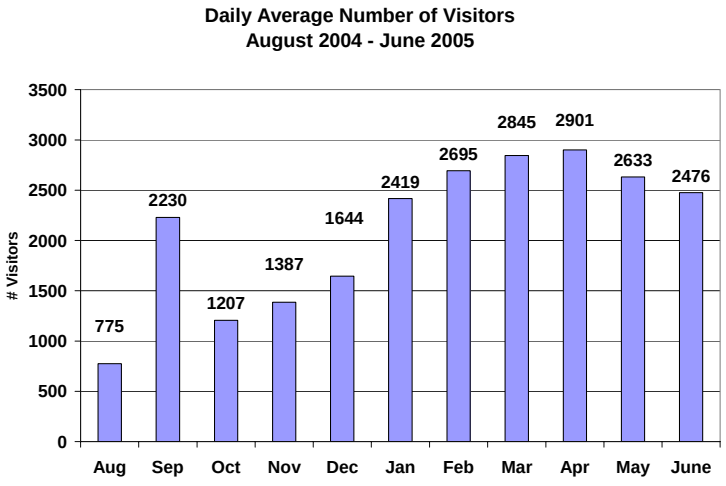
Mark continued to improve and expand the Center's web presence. He developed systems that make web publishing more efficient yet less centralized with higher quality control. The result is a web presence that is flexible and capable of rapid growth. These systems include two databases, one including all individuals affiliated with the Center and another which houses the Center's publications and the Climate Services Clearinghouse. In recognition of Mark's significant contributions the Center awarded him its 2004 Outstanding Performance Award.

- **Science and Technology Policy Web Resources**, http://sciencepolicy.colorado.edu/web_resourses/index.html
  This page provides links to S&T journals, publications, organizations, and centers around the country.
- **Media Resources**, http://sciencepolicy.colorado.edu/media_resources/index.html
  This page provides the media and other interested readers with links to Center resources on selected topics such as space policy and drought.
- **Extreme Weather Sourcebook 2001**, http://sciencepolicy.colorado.edu/sourcebook/
  The Extreme Weather Sourcebook 2001 Edition is a source of economic and other societal impacts related to hurricanes, floods, tornadoes, lightning, and other U.S. weather phenomena.



Website Visits

Website traffic has grown substantially from 2002 when an average of 325 visitors per day visited our site. Now we are averaging more than 2,500 unique visitors each day, depending on the time of year and whether our newsletter was recently published. The following graph shows the daily average number of visitors to our website over the past year:



Media Coverage

Since opening in the fall of 2001, Center staff and projects have been referenced by the following media:

Aerospace America Magazine
Against the Grain
American Prospect
Associated Press
Audobon Magazine
Baltimore Sun
BBC Radio
Boston Globe
Christian Science Monitor
Chronicle of Higher Education
Colorado Daily
Colorado Springs Gazette
Daily Camera
Daily Utah Chronicle
Dallas Morning News
Denver Business Journal
Denver Post
Discovery Channel
Drug Development and Discovery
The Economist
EOS
EU Reporter
Financial Post
Financial Times
Fort Collins Coloradoan
Galileo (Italy)
Greenwire
Houston Chronicle
IEEE Sprectrum
Il Messaggero (Italy)
Insure.com
Jackson Hole News and Guide
Journal of Young Investigators
Kansas City Star
KMGH Channel 7 news
KNUS Radio
KOA Radio
Kristeligt Dagblad (Denmark)
LA Times
Longmont Daily Times-Call
MSNBC
Naples Daily News
National Public Radio
Natural Hazards Observer
Nature
New Orleans Times-Picayune
New York Times
Pacifica Radio
Philadelphia Inquirer
Pittsburgh Post Gazette
Rocky Mountain News
San Francisco Chronicle
Santa Fe New Mexican
Sarasota Herald Tribune
Science
Scientific American
The Scientist
Scripps-Howard News Service
SETI Radio Network
Swedish Public Radio
The Times-Picayune
UPI
USA Today
Washington Times
Weekly Standard

Media References

The following media references to Center personnel or projects appeared in 2004-2005:

- Roger Pielke, Jr.,'s article on hurricanes and global warming was the subject of a June 17 Daily Camera article.
- Lisa Dilling was part of a radio show "Skeptical Sunday: Global Warming - Is There Any Room for Doubt?" on June 5.
- Roger Pielke, Jr. was quoted in a June 3, 2005 Denver Post article "Study: Humans to blame for warming of oceans."
- Roger Pielke, Jr. was quoted in the May Audubon magazine review of Michael Crichton's State of Fear.
- Prometheus weblog was discussed in an April 5 UPI column on climate science and politics.
- Roger Pielke, Jr., was quoted in a March 6 Kansas City Star article about the recent distrust of science.

- Roger Pielke, Jr. was quoted in a March 7 UPI article on climate change policy and politics.
- Roger Pielke Jr.'s work was cited in a February 15 Philadelphia Inquirer article on climate change debate.
- The Presidential Science Advisor series talk was the subject of a February 15 Daily Camera article.
- Roger Pielke, Jr. was quoted in a February 14 Wall Street Journal article about the debate in climate science and politics.
- Roger Pielke, Jr., was quoted in a February 11 Space.com article on shuttle fleet costs.
- The Presidential Science Advisor series was the subject of a February 10 Daily Camera article.
- Roger Pielke, Jr. was quoted in a January 23 Daily Camera article on politics and the IPCC.
- Roger Pielke, Jr.'s research was the subject of a January 17 Denver Post column.
- The Prometheus weblog was cited in a January 12 essay on Tech Central Station.
- Roger Pielke, Jr. was quoted in a January 3 UPI story on the changing nature of the climate debate.
- Roger Pielke, Jr. was quoted in a December 21 Financial Post article on climate change and insurance.
- Roger Pielke, Jr. was quoted in a December 1 Daily Camera article on the Climate Change summit.
- Roger Pielke, Jr. was interviewed on Pacifica Radio about Russia's ratification of Kyoto Protocol.
- The Center's SPARC project was reported in the Natural Hazards Observer.
- Roger A. Pielke, Jr. was quoted in an October 24 Daily Camera article on green issues and the presidency.
- Roger Pielke, Jr. was quoted in an October 22 Pittsburgh Post-Gazette article on flood policy.
- Roger Pielke, Jr., was quoted in an October Journal of Young Investigators article on abrupt climate change.
- Roger Pielke, Jr. was quoted in the September Drug Development & Discovery on politics and science in the Bush Administration.
- Roger Pielke, Jr. was quoted in the September 19 Naples Daily News on global warming and hurricanes.
- Roger Pielke, Jr. was quoted in the September 17 Chronicle of Higher Education about science policy and the presidential candidates.
- Roger Pielke, Jr. was quoted in the September 15 Baltimore Sun about Hurricane Camille.
- Roger Pielke, Jr. was quoted in the September 14 New York Times about hurricane forecasting.
- Roger Pielke, Jr., was quoted in the September 14 Colorado Daily about hurricane research.
- Roger Pielke, Jr. was quoted in the September 13 Christian Science Monitor about the hurricane season.
- Roger Pielke, Jr. was quoted in the September 12 Philadelphia Inquirer about politics and disaster declarations.
- Roger Pielke, Jr., was quoted in the September 8 Philadelphia Inquirer about Hurricane Frances.
- Center Faculty Affiliate Kathleen Tierney was interviewed in the September 7 New York Times.
- Excerpts from Roger Pielke's Hurricane Camille report were published in the September 5 Sarasota Herald Tribune.
- Roger Pielke, Jr., was quoted in a September 3 Philadelphia Inquirer article about Hurricane Frances.
- Roger Pielke Jr. was quoted in an August 30 Greenwire story about a new climate report.
- Roger Pielke Jr. was quoted in an August 14 Associated Press article about science and politics.
- The Center's $2.4 million NSF award was the subject of an August 10 Colorado Daily article.
- Roger Pielke, Jr. was interviewed on Swedish Public Radio on August 10.
- Roger Pielke Jr. was quoted in the August 6 Daily Camera about the Center's $2.4 million NSF award.
- Roger Pielke, Jr. appeared on the radio show "Against the Grain" on July 28.

Links to these articles can be found on the In the News page (http://sciencepolicy.colorado.edu/outreach/news.html).

People

Who's New


Lisa Dilling

On October 1 the Center welcomed **Dr. Lisa Dilling** as a CIRES Visiting Fellowship. Dr. Dilling received a Ph.D. in Biology from the University of California, and was most recently employed as a Project Scientist with the Environmental and Societal Impacts Group of the National Center for Atmospheric Research. Her research focuses on the use of information in decision making related to climate and, in particular, the carbon cycle. Lisa brought the following projects to the Center:

- Scales of Decision-Making and the Carbon Cycle
- State of the Carbon Cycle Report
- Communicating Urgency, Facilitating Social Change: New Strategies for Climate Change

Lisa is also a key participant in the Center's Carbon Cycle Science and Science Policy Assessment and Research on Climate projects.


Linda Pendergrass

Linda Pendergrass joined the Center this past spring as our Office Manager, replacing Ami Nacu-Schmidt who took a new position as Outreach Coordinator for the Science Policy Assessment and Research on Climate (SPARC) project. Linda was the office manager for the CIRES message center for the past 3 years. She has a Bachelor's Degree in Interdisciplinary Sciences with an emphasis on Environmental Biology and Chemistry.

Sally Dowlatshahi, a graduate student who received her B.S. in electrical engineering from the University of Illinois-Chicago in December 2001, joined our staff to help on the Science Policy Assessment and Research on Climate (SPARC) project.

Our Staff

Rad Byerly is a Research Scientist who has worked at the Center since its inception in 2001. Rad received his Ph.D. in experimental atomic and molecular physics at Rice University in 1967. He is the former chief of staff for the U.S. House of Representatives Committee on Science and Technology. Since retiring he now works with students to offer his perspective as a practitioner and with faculty on various projects.

Martyn Clark joined the Center in January 2002 as a Research Scientist. Martyn received a Ph.D. from the University of Colorado in 1998, and has worked since then as a research scientist at the Cooperative Institute for Research in Environmental Sciences.

Subhrendu Gangopadhyay, a Research Associate in hydroclimatology, left the Center last winter and joined Hydrosphere, a Boulder, Colorado-based hydrology consulting firm.

Bobbie Klein is the Center's Managing Director. She has a B.A. in political science from the University of Illinois, a J.D. from the University of Wisconsin, and an M.A. in Public Policy from the University of Colorado. Prior to joining the Center she worked at the National Center for Atmospheric Research.

Myanna Lahsen joined the Center in June 2003 after serving as a Postdoctoral Fellow, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University. She is an anthropologist studying understandings of carbon cycle science who is currently working under an NSF grant in Brazil. She is also a CSP Project Scientist, Swedish Institute for Climate Science and Policy Research, (2004-present, projected until 2010), and was recently accepted as Assistant Professor at IUPERJ, a university in Rio de Janeiro, Brazil.

Mark Lohaus is the Center's Webmaster. Mark has a double degree in Chemistry and Internet Database Applications from Metropolitan State College of Denver.

Ami Nacu-Schmidt is the Center's Administrator and Outreach Coordinator. Ami received her B.A. in Psychology from the University of Colorado.

Linda Pendergrass joined the Center this past winter as our Office Manager. Linda has a B.A. in Interdisciplinary Sciences with an emphasis on Environmental Biology and Chemistry.

Roger Pielke, Jr. has served as the Center's Director since its inception. Roger joined the faculty of the University of Colorado in July 2001 where he is a Professor in the Environmental Studies Program and a Fellow of the Cooperative Institute

for Research in Environmental Sciences. From 1993-2001 Roger was a Scientist at the Environmental and Societal Impacts Group at the National Center for Atmospheric Research. Roger holds a B.A. in mathematics and a Ph.D. in political science, both from the University of Colorado.

Brad Udall joined the Center in January 2003 as the Western Water Assessment's Managing Director. He was educated at Stanford (B.S. Engineering) and at Colorado State (M.B.A.). He was a partner with Hydrosphere, a hydrology consulting firm, and he started the Eagle Valley Land Trust in Vail. He has relocated along with the WWA.

AFFILIATES

Center affiliates are significant, long-term collaborators or colleagues who share an interest in science and technology policy.

- **Susan Avery**, Interim Provost, University of Colorado
- **Tom Chase**, Assistant Professor of Geography, University of Colorado
- **Doug Kenney**, Research Associate, Natural Resources Law Center, University of Colorado
- **Paul Komor**, Lecturer in the Department of Civil Engineering, University of Colorado, and a Project Director at E SOURCE
- **Frank Laird**, Associate Professor, Graduate School of International Studies, University of Denver
- **Jill Litt**, Assistant Professor of Environmental Health, Department of Preventive Medicine and Biometrics, School of Medicine, University of Colorado Health Sciences Center and the Environmental Studies Program, University of Colorado
- **Diane McNight**, Fellow, INSTAAR; Professor of Civil, Environmental and Architectural Engineering, University of Colorado
- **Jana Milford**, Associate Professor, Mechanical Engineering and the Center for Combustion and Environmental Research, and director of the Environmental Engineering Program, University of Colorado
- **Carl Mitcham**, Professor of Liberal Arts and International Studies, Colorado School of Mines
- **Jerry Peterson**, Professor, Department of Physics, University of Colorado
- **R. Balaji Rajagopalan**, Assistant Professor and Fellow, CIRES, Department of Civil, Environmental and Architectural Engineering, University of Colorado
- **Joe Ryan**, Associate Professor, Department of Civil, Environmental, and Architectural Engineering, Director of the Environmental Engineering Program, and Environmental Studies Program, University of Colorado
- **Dan Sarewitz**, Managing Director, Center for Science, Policy and Outcomes, Arizona State University
- **Doug Sicker**, Assistant Professor, Department of Interdisciplinary Telecommunications, University of Colorado
- **Kathleen Tierney**, Director, Natural Hazards Center and Professor of Sociology, University of Colorado
- **Phil Weiser**, Associate Professor, Interdisciplinary Telecommunications Program and the School of Law, University of Colorado
- **Alex Wolf**, Associate Professor, Department of Computer Science, University of Colorado
- **Tom Yulsman**, Associate Professor, School of Journalism & Mass Communication, co-director of the Center for Environmental Journalism, Environmental Studies Program, University of Colorado

Staff Highlight

Ami Nacu-Schmidt

In addition to providing administrative e support for the Center for the past four years, Ami has developed significant expertise in website design through classes taken at CU's Continuing Education. In recognition of her growing expertise Ami's job description was redefined to include Outreach Coordinator for the Center's new NSF project, Science Policy Assessment and Research on Climate (SPARC). Ami has designed attractive and functional new websites for both the SPARC project (http://sciencepolicy.colorado.edu/sparc) and the Presidential Science Advisor series (http://sciencepolicy.colorado.edu/scienceadvisors).

VISITORS AND COLLABORATORS

The Center collaborates with other scientists and professionals from around the world. The following individuals collaborated with Center staff on proposals or projects, co-authored papers with Center staff, or visited the Center in 2004-2005:

- Susan Avery, Interim Provost, University of Colorado
- Andy Barrett, National Snow and Ice Data Center
- Gary Bates, Climate Diagnostics Center
- Russell Bigley, Climate Diagnostics Center
- D. Brandon, Colorado Basin River Forecast Center
- Ryan Church, University of Colorado School of Business graduate student
- Rich Conant, Natural Resources Ecology Lab, CSU
- Greg Cronin, CU-Denver Dept. of Biology
- Henry Diaz, Climate Diagnostics Center
- Randall Dole, Climate Diagnostics Center
- Mary Downton, National Center for Atmospheric Research
- William Easterling, Penn State
- Jon Eischeid, Climate Diagnostics Center
- Robert Frodeman, University of North Texas
- Chris Goemans, Institute for Behavioral Studies
- Katrina Grantz, CADSWES, University of Colorado
- Alan F. Hamlet, Center for Science in the Earth Systems, U of Washington
- Lauren Hay, USGS
- Martin Hoerling, Climate Diagnostics Center
- Charles Howe, Institute for Behavioral Studies
- Shaleen Jain, Climate Diagnostics Center
- Douglas Kenney, Natural Resources Law Center
- Jessica Lang, Western Water Assessment
- Frank Laird, University of Denver
- Dennis Lettenmaier, Center for Science in the Earth Systems, U of Washington
- Dr. K. Mark Leek, Pacific Northwest National Laboratory
- William Lewis, Center for Limnology
- Bjorn-Ola Linner, Linkoping Universitet (Sweden)
- Jeff Lukas, Institute of Artic and Alpine Research
- John Marburger, Science Advisor to President G.W. Bush
- Sarah Michaels, National Center for Atmospheric Research
- J. Z. B. (Zoe) Miller, National Center for Atmospheric Research
- Donald Mock, CDC Executive Director
- Susie Moser, National Center for Atmospheric Research
- M. Murphy, CIRES Center for Limnology
- Claudia Nierenberg, NOAA Office of Global Programs
- Gunilla Oberg, Linkoping Universitet (Sweden)
- Martin Parry, IPCC Working Group II
- John Pitlick, Dept. of Geography
- Roger Pulwarty, Climate Diagnostics Center
- Balaji Rajagopalan, Dept. of Civil, Environmental and Architectural Engineering
- Andrea Ray, Climate Diagnostics Center
- Steve Rayner, University of Oxford
- Satish Regonda, Center for Advanced Decision Support for Water and Environmental Systems
- Craig Roseberry, U.S. Army
- Lee Rozaklis, Hydrosphere
- Anne Ruggles, Visiting Scholar
- James Saunders, Center for Limnology
- Dan Sarewitz, Consortium for Science, Policy, and Outcomes
- Andrew Slater, CIRES
- Danny Smith, Department of Soil and Crop Sciences, CSU
- Paul Sperry, Cooperative Institute for Research in Environmental Sciences
- Reagan Waskom, Department of Soil and Crop Sciences, CSU
- Robert ("Robin") Webb, Climate Diagnostics Center
- Peter Weiss, National Weather Service
- John Wiener, Institute for Behavioral Studies
- Klaus Wolter, Climate Diagnostics Center
- Connie Woodhouse, National Climatic Data Center
- Tom Yulsman, University of Colorado Journalism Department
- Edie Zagona, CADSWES, University of Colorado

BOARDS AND COMMITTEE MEMBERSHIP

Rad Byerly

NRC Space Studies Board. The board conducts policy studies for the nation's space program. Rad serves on its Executive Committee.

Roger Pielke, Jr.

Editorial Boards

2004-	Member, Editorial Board, Environmental Science and Policy
2004-	Member, Editorial Board, Darwin
2003-2005	Member, Editorial Board, International Encyclopedia of Science, Technology and Ethics
2001-	Member, Editorial Board, Bulletin of the America Meteorological Society
2001-	Member, Editorial Board, Policy Sciences
2001-	Member, Editorial Board, Natural Hazards Review

Staff Highlight

Roger Pielke, Jr.

In 2004 Roger was promoted to full professor in the Environmental Studies Program. In 2004-2005 Roger enjoyed experimenting with the Prometheus weblog, and continued research, education and outreach activities on science and technology policy.

National and International Committee Service

2005-	Member, National Research Council NASA Decadal Survey Committee
2005-	Member, Advisory Committee, Societal Impacts Group, National Center for Atmospheric Research
2003-	Advisory Panel, Program on Societal Dimensions of Engineering, Science and Technology, National Science Foundation
2003-	Member, Advisory Committee, Pacific ENSO Applications Center
2001-	Member, Board of Directors, WeatherData, Inc.

Center for Science and Technology Policy Research
Final Strategic Plan
January 2004

Introduction

What are the societal implications of advances in biotechnology? What energy policy alternatives do decision makers have in the face of fundamental uncertainties about the long-term future climate? How will homeland security affect the direction of U.S. research? What should be the goals of the United States space program in coming decades? How might the intermountain western United States cope with the twin pressures of population growth and water scarcity? Questions such as these consider the role of science and technology in decision making as well as decision making about science and technology. Science and technology policy research can help inform decision making about these and other important issues.

The University of Colorado's Center for Science and Technology Policy Research -- located within the Cooperative Institute for Research in Environmental Sciences -- has become a national and international leader in science and technology policy research and education since its inception in 2001. The Center's work has been cited or considered in the Columbia Accident Investigation Board's report (the "Gehman Report") on the loss of the space shuttle Columbia, in debates of the U.S. Congress on climate change policy, by municipalities around the region dealing with the 2002 drought, and in media outlets such as The Economist and The New York Times. The Center's influence results from a commitment to rigorous research and effective outreach.

The CIRES Policy Center is also taking a leadership role in interdisciplinary science and technology policy education. In 2003, a group of 17 faculty members from Engineering, Law, Journalism, Arts and Sciences (representing science, social science, and the humanities), and the CU-Health Sciences Center gained approval of a new graduate certificate program in science and technology policy to begin in spring 2004.

The Center complements major University of Colorado initiatives in areas such as biotechnology, aerospace engineering, and environment and sustainability. These initiatives are made more effective when they are augmented by research and education that explores the implications of science and technology for decision making. In addition, the Center responds to demands from various quarters including funding agencies, decision makers, and prospective undergraduates and graduate students for research and education that explores the broader impacts of science and technology in society.

The following plan embodies the Center's vision for the next five years.

Vision

To serve as a resource for people, groups, or institutions that make decisions about science and technology.

Mission Statement

The Center conducts research, education, and outreach to improve the relationship between societal needs and science and technology policies.

Strategy for the Future

The Center will fulfill its mission through research, education, and outreach within the following themes:

1. **Evaluating the relationship between societal needs and science and technology policies.**

   The Center evaluates the two-way connections between decision makers and scientific researchers and develops recommendations to improve the flow of useful information in both directions. This evaluation often involves "learning by doing", that is, by developing and assessing experimental partnerships between operational and research communities.

2. **Providing new policy alternatives for science and technology policy decision makers.**

   Center research seeks to expand and/or evaluate policy alternatives available to science and technology policy decision makers. A science and technology policy decision maker is a person, group, or institution with responsibility for making important decisions about the substance or process of science and technology. Examples of science and technology policy decision makers include people who allocate resources among research areas and people who prescribe norms for the conduct of research, such as rules for using human subjects. This perspective distinguishes the Center's work from that of policy advocacy groups, which seek to reduce available alternatives in the political process.

3. **Developing tools for science and technology policy decision making.**

   Through its research the Center develops tools, and through its outreach it communicates these tools to science and technology policy decision makers to help them identify, evaluate, and eventually fill their information needs.

   See the Appendix for a list of current activities.

Objectives in Support of Strategy

Scientific Scope and Direction

Center research is highly interdisciplinary, in recognition of the fact that the decision or problem under consideration dictates the sort of knowledge that is most useful to decision makers. The Center's interdisciplinary research is integrated with the ongoing activities of CIRES, its primary sponsor the National Oceanic and Atmospheric Administration, the University, and the broader science and technology community.

The following objectives will help define the scope and direction of the Center's research efforts over the next five years:

- Develop a diversity of proposals and projects across the Center's three themes and secure the resources necessary to complete these projects.
- Establish and formalize national and international partnerships on issues of science and technology policy research.
- Initiate a major new research effort on decision making under uncertainty.
- Become the national leader in the development of the field of humanities policy.
- Become a national center in the development of interdisciplinary approaches to scientific research and education.
- Understand society's need for emerging scientific information and products, and develop and test innovative methods for disseminating such information and products.

Education, Outreach and Communication of our Findings

In partnership with University departments in the social and physical sciences, law, humanities, engineering, and other areas, the Center will continue to develop a strong pedagogical presence at both undergraduate and graduate levels. The Center also will continue its outreach efforts to the academic community and private and public decision makers. The following are the Center's objectives for education and outreach:

- Implement and institutionalize the Graduate Certificate Program in Science and Technology Policy.
- Expand our capabilities in outreach to new communities through innovative use of information technology. Continue to develop our WWW presence with success to be measured by the number and diversity of "hits."
- Hold an annual named conference/workshop/symposium that would address a different topical subject each year. Aim to include senior congressional staff. Produce a written report, aimed at decision makers, summarizing the conclusions reached.
- Start a peer-reviewed journal.
- Increase publication of Ogmius to 4 times a year.
- Start a monthly lecture series focused each semester on a current S&T policy issue.

Human and Physical Resource Development

The Center's ongoing success will depend critically upon attracting and retaining high quality staff and its ability to provide the infrastructure necessary to support its research, education, and outreach activities. The following objectives will help ensure that the Center's human and physical resources are adequately developed to meet its needs:

- Add 5 FTE faculty positions for the CIRES Policy Center over 5 years all focused on "policy research" potentially in partnerships with other departments and institutes.
- Increase the diversity of Center staff and students.
- Obtain a sustained level of core operating support by 2008.
- Obtain sufficient space for the entire Center to be co-located on the main campus.
- Establish an endowed visiting professorship or visiting practitioner to have a continuing, recognized program, as well as to have a continuing flow of new ideas into our program.
- Establish an "alumni association", which would include former students, post-docs, employees, and affiliates.
- Hire a communications specialist.
- Hire a second webmaster.

APPENDIX TO STRATEGIC PLAN

Center projects currently include the following:

- **Atmospheric Sciences Policy Education and Network (ASPEN)** – *research, education, and outreach* aimed at providing policy alternatives and developing tools for decision making about weather policy.
- **Decision Making Under Uncertainty (DMUU)** - pending
- **Flatirons Outdoor Classroom** - an interdisciplinary outdoor *educational* opportunity that develops tools for decision making such as curricular materials designed to make effective use of the classroom.
- **Global Climate Change and Society (GCCS)** - a summer *research and education program* for undergraduates that evaluates the relationship between societal needs and science and technology policies regarding global climate change research. Students are encouraged to develop policy alternatives.
- **Graduate Certificate in Science and Technology Policy (S&T Certificate)** - a rigorous *educational* program to prepare students pursuing graduate degrees for careers at the interface of science, technology, and decision making. In this program students will be asked to evaluate the relationship between societal needs and S&T policies, and to propose policy alternatives for decision makers as well as develop tools for decision making.
- **Hydro-Climate Research and Decision Making** – an experimental partnership that identifies the information needs of water managers in different parts of the country and through hydro-climate *research* develops tools to meet those needs.
- **New Directions in the Earth Sciences and the Humanities** - seeks to integrate the public and values-dimensions of our environmental challenges with on-going scientific *research and education*.
- **RAA-NCAR-CU Joint Internship Program** – an *educational* program that places policy or science graduate students with reinsurance companies to evaluate alternatives available to decision makers within these companies.
- **"Science, Technology and Security: Knowledge for the Post-9/11 World" (Symposium)** – an *outreach* activity that sought to improve the flow of useful information between decision makers and scientists from institutions along the Colorado Front Range on topics relating to homeland security.
- **Understanding and Enhancing Linkages Between Decision Making and Carbon Cycle Research** – seeks to strengthen the interconnections of the supply and demand sides of carbon cycle research, leading to recommendations to agencies that support carbon cycle science and decision making focused on future research and institutional designs.
- **Western Water Assessment (WWA)** – through *research, education, and outreach*, this project seeks to increase the relevance and value of scientific information to improve the decision making strategies of water managers in the intermountain west.

In addition, the Center's outreach activities include publication of articles in peer-reviewed journals and other venues, publication of a newsletter three times a year, development of an extensive website, talks by Center staff, testimony before governmental bodies, and listservs.

GRANT ACTIVITY

Current/Pending Proposals, 2004-2005

Project/Proposal Title	Source	Amount	Start Date	End Date
Science Policy Assessment and Research on Climate – Decision Making Under Uncertainty	NSF	$2,400,000	1/05	12/09
Understanding and Enhancing the Linkages Between Decision-Making and Carbon Cycle Research	NOAA OGP	$118,120	10/02	8/05
CU Engineering Test Beds for Real-Time Technology Assessment (RTTA)	Subcontract with Arizona State University	$84,000	2008	2009
Western Water Assessment (through March 2005)	NOAA OGP	$3,890,000	2/02	1/07
Our Science and Their Science--Conflicting Agendas and Disputed Theories Concerning Amazonia	NSF	$179,936	3/03	3/06
Development of Operational Hydrologic Forecasting Capabilities	NOAA	$364,887	5/02	4/05
Investigation of the Spatial and Temporal Variations of the Seasonally Frozen Ground in the Contingent United States	DOE	$232,059	7/02	6/05
Understanding the Spatio-Temporal variability of the North American Monsoon: Implications to Water Resources Management in the South Western U.S.	NOAA	$213,427	1/03	1/06
Collaborative Research: A land surface model hind-cast for the terrestrial Arctic drainage system	NSF	$125K/YR	2003	2008
Improving Operational Streamflow Forecasts in the Colorado River Basin	NWS	$280,000	6/04	5/07
Scales of Decision Making and the Carbon Cycle	NOAA	$266,088	5/04	4/07
Lessons in Technology Transfer Policy for the Atmospheric Sciences: A case study in Public-Private-Academic Partnership on Level II Radar Data	NWS	$30,000	1/05	12/05
The State of the Carbon Cycle: North America	NASA, NOAA, DOE, NSF	$272,843	9/04	12/05

CENTER FOR SCIENCE AND TECHNOLOGY POLICY RESEARCH

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