

*University
of Colorado*

*Center for Science
and Technology
Policy Research*

Annual Report

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COOPERATIVE INSTITUTE FOR RESEARCH
IN ENVIRONMENTAL SCIENCES

UNIVERSITY OF COLORADO AT BOULDER

1333 GRANDVIEW AVENUE

CAMPUS BOX 488

BOULDER, CO 80309-0488

PHONE: 303-735-0451

FAX: 303-735-1576

<http://sciencepolicy.colorado.edu>



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In 2003-2004 issues related to science and technology occupied the center of many important policy debates. Examples in the United States include the role of intelligence in the justification for and decision to go to war in Iraq, accusations from several groups that the administration of George W. Bush misused science to advance its political agenda, controversy over federal support of embryonic stem cell research, and the future of the National Aeronautics and Space Administration (NASA) and the civilian space program. More broadly, debate continues on issues such as global climate change, agricultural biotechnology, and international security and terrorism. Because science and technology play a crucial role in issues like these research and education in science and technology policy offer the potential to expand alternatives available to decision makers grappling with difficult challenges at the intersection of science, technology, and society.

In 2003-2004 the Center for Science and Technology Policy Research, located within the Cooperative Institute for Research in Environmental Sciences at the University of Colorado, undertook a strategic planning exercise to set goals and priorities for the next five years. From that exercise we developed the following Vision, Mission Statement, and Themes:

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.

Themes

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

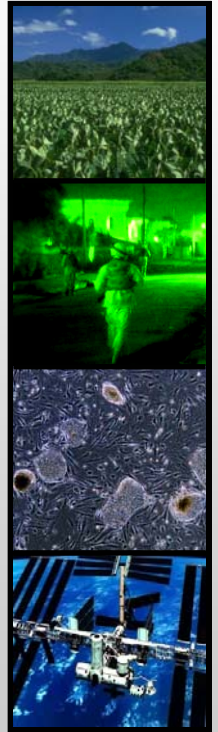
1. Evaluating the relationship between societal needs and science and technology policies.
2. Providing new policy alternatives for science and technology policy decision makers.
3. Developing tools for science and technology policy decision making.

The plan will guide the Center's direction over the next five years. It is reproduced in full in the Appendix to this report and is also available online at

http://sciencepolicy.colorado.edu/center_info/strategic_plan.pdf.

This Annual Report of the Center's activities for 2003-2004 describes our work in support of our strategic plan. Our productive, dedicated, and highly skilled staff made this an active and successful year in research, education, and outreach.

We hope that you will find this report of our 2003-2004 activities to be informative. We welcome your feedback (pielke@colorado.edu).



What's New 2003-2004

NEW ACTIVITIES

- Ten graduate students who constitute the first cohort of the recently approved **Graduate Certificate Program in Science and Technology Policy** initiated the program in the spring of 2004 with a course entitled Science and Technology Policy taught by Roger Pielke, Jr.
 - In response to the steadily increasing development of climate products and services, ENVIS Ph.D. candidate Genevieve Maricle is working on a project funded by the Western Water Assessment to compile and coordinate climate services across sectors. The site, **Climate Services Clearinghouse** (<http://sciencepolicy.colorado.edu/climateservices/>) includes climate products from NOAA, other government agencies, academia, and the private sector. The Clearinghouse seeks to coordinate, and thus enhance, the efficiency of climate service production by enabling providers to identify and fix overlaps and gaps in existing services.
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- The Center led preparation of a successful grant proposal under the National Science Foundation's Decision Making Under Uncertainty program, in partnership with Arizona State University's Consortium for Science, Policy, and Outcomes. The project—**Science Policy Assessment and Research on Climate (SPARC)**—recognizes that society's strategy for responding to and preparing for climate change in the face of ongoing uncertainty hinges upon the relationship between science policy decisions and climate policy decisions, a relationship that has never been systematically examined. SPARC will help fill this gap through a focus on areas of science policy decision making where uncertainty strongly influences how knowledge is made available to society for responding to climate change. The overarching focus of the project will be on reconciling the supply of and demand for climate research, with an investigation of the role of models in climate science programs and the development of methods and tools for prioritizing research efforts based on a better understanding of the relative magnitude of various sources of global environmental change. After a set of peer reviews, an onsite visit from NSF, and a project revision, SPARC received a multi-million dollar award. The 5-year project will begin in 2005.
 - The National Weather Service awarded Center Research Scientist and Western Water Assessment Director Martyn Clark a three-year grant to develop and evaluate methods to assimilate station-based measurements of snow water equivalent into the NWS River Forecast System, and to develop and evaluate methods to produce forecast inputs on time scales of days through seasons. The project, **Improving Operational Streamflow Forecasts in the Colorado River Basin**, will be conducted in collaboration with the Colorado Basin River Forecast Center.
 - The first annual meeting of two professional associations in the environmental philosophy community was held June 1-4, 2004 and co-organized by Center Research Scientist Bob Frodeman. Co-sponsored by the Center, the meeting brought together the **International Association for Environmental Philosophy** and the International Society for Environmental Ethics.
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- The National Science Foundation awarded Bob Frodeman a grant for a workshop in St Petersburg, Russia in June 2004 under his project on **New Directions in the Earth Sciences and Humanities** that brought together twelve American and eighteen Russian participants under the theme "Cities and Rivers: Interdisciplinary and International Perspectives." This workshop built upon the work of the New

Directions Initiative to develop a testable model for interdisciplinary collaborations on issues at the intersection of science and society. The workshop is part of The Neva Project, a collaborative attempt to look at four sites on the Neva River in St. Petersburg, Russia, from both the ecological and cultural perspectives simultaneously.

- Bob Frodeman organized a conference at Penn State University October 9-11, 2003 entitled “New Directions in Interdisciplinary Research: A Conference in Real World Experiments” as part of a collaboration between **New Directions in the Earth Sciences and the**

Humanities and the University of Bielefeld’s Real World Experiments Program. The conference sought to develop tools for the planning and implementation of scientifically reliable and socially robust approaches of environmental design; identify the specific contribution of the humanities to environmental solutions; and make scientific information more pertinent to society.

- The **Western Water Assessment** completed a strategic planning process in 2004. The WWA’s revised mission statement provides that “the mission of the WWA is to identify and characterize regional vulnerabilities to climate variability and change, and to develop information, products and processes to assist water-resource decision-makers throughout the Intermountain West.” The planning process identified research objectives and developed guidelines for research projects and the proposal process, as well as selection criteria for projects. Sixteen projects were selected for funding in 2004. The WWA website, <http://sciencepolicy.colorado.edu/wwa/>, underwent substantial revision and updating in 2004.

Staff Highlight *Rad Byerly*

Rad Byerly took the lead as rapporteur in preparing the summary of a workshop on national space policy. The workshop reached conclusions consonant with the policy subsequently announced by the President. R. Byerly, Issues and Opportunities Regarding the U.S. Space Program, A Summary Report of a Workshop on National Space Policy, Space Studies Board, National Research Council, Washington, DC, 2004.



RECENT ADDITIONS

- The Center added two new visiting scholars this year. **Lauren McCain** received her Ph.D. from the University of Colorado Department of Political Science in 2003. Her dissertation appraised key policies shaping the Human Genome Project research and technology development. Lauren has worked on S&T policy issues with the International Rivers Network in Berkeley, California, the National Center for Genome Resources in Santa Fe, New Mexico, and the Center for Science, Policy, & Outcomes in Washington, DC.
- **Anne Ruggles** has an M.S. in Wildlife Biology from the University of Alaska at Fairbanks. She received a J.D. from the University of Colorado School of Law with an emphasis in natural resources law in 2003. While a third year law student Anne was an extern at the Center conducting a study on the use and misuse of science in the Klamath Basin controversy. Anne is currently writing an article summarizing her study, as well as developing a website about the Klamath Basin controversy.



The Center welcomed two new faculty affiliates.

- **Kathleen Tierney** is a Professor of Sociology and Director of the Natural Hazards Research and Applications Information Center at the University of Colorado at Boulder. She received her Ph.D. from Ohio State University. Her research interests are social dimensions of hazards and disasters, including natural, technological, and human-induced extreme events. Her current research studies the organizational response to the September 11, 2001 World Trade Center disaster, risk perception and risk communication, the use of new technologies in disaster management, and the impacts of disasters on businesses.
- **Jerry Peterson** is a Professor of Physics at CU. He received his Ph.D. from the University of Washington in 1966, and has been on the Boulder campus since 1970. His research is in basic experimental nuclear physics, largely using accelerator facilities around the world. His research career in nuclear science and his contacts over the years have led to his additional current emphases on domestic nuclear security, the internationalization of nuclear science, and the development of educational tools for future national workforce needs in nuclear science. He gave a provocative talk at the Center this spring on "Attribution Doctrines and Policies Following WMD Attacks."



INTERNATIONAL VISITORS

In furtherance of the strategic plan objective of "establishing and formalizing national and international partnerships on issues of science and technology policy research," the Center was very fortunate to host two international visitors this year.

- **Gunilla Öberg** from the Department of Thematic Studies, Campus Norrköping, Linköpings Universitet, Sweden, visited the Center March 4-11, 2004 to begin collaboration on a project for which she has recently been awarded support in Sweden and for which the Center serves as a major partner. The project is called "Climate Science and Policy Beyond 2012" or "CSP 2012+." The overarching objective of CSP 2012+ is to develop action alternatives to support international climate change decision making with an explicit focus on the period 2012 and beyond. The project's focus is on the current, expected future, and potential role of knowledge in international climate negotiations. The operational aims are as follows: (i) to identify and specify the knowledge that will be needed to inform future climate policy, and (ii) to suggest and develop strategies for helping decision makers and scientists to effectively create, communicate and ultimately use this knowledge to improve policy. The Center is a major international collaborator. The project formally kicks off in summer 2004.
- **Professor Wolfgang Krohn**, provost and professor of science, technology, and society at the University of Bielefeld, Germany, visited the Center for three months. Professor Krohn works at Bielefeld's Institute for Science and Technology Studies, and researches questions at the intersection of history, philosophy, science, and culture. During his visit he worked on a manuscript on the philosophy of technology, and explored opportunities for future collaborations with the Center. He gave a talk at the Center entitled "Technology, Knowledge and Organization of Waste Management."



Research

The Center conducts research that is integrative across the physical, social, biological, and policy sciences (as well as other fields, including the humanities). The specific decision or problem that is the focus of inquiry dictates the sort of knowledge that is relevant to the research. Through its research the Center aims to help the scientific community better focus its efforts on issues of importance to society so that decision makers can more effectively incorporate scientific and technological advances into their decision processes.

The theme(s) from the Center's 2004 Strategic Plan that each project falls within is indicated.

- **Climate Services Clearinghouse** (Pielke, Maricle)

A clear gap has emerged between the climate information needs of society and the scientific research meant to satisfy 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. As a result, it enables providers to identify and fix overlap and gaps in existing services. It also enables site visitors to locate any service of interest.

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

Strategic Plan Theme: evaluating relationships



- **Global Climate Change and Society** (Frodeman)

GCCS, an NSF Research Experience for Undergraduates (REU) program, introduced a group of 12 undergraduates from higher education institutions around the country to the constellation of perspectives surrounding the question of global climate change. Students gathered and evaluated scientific data and investigated the social, political, psychological, economic, and philosophical issues surrounding the interpretation and use of these data for addressing contemporary controversies over global climate change. GCCS completed its third and final session in the summer of 2003.

Website: <http://sciencepolicy.colorado.edu/gccs/index.html>

Strategic Plan Theme: developing alternatives



Staff Highlight *Martyn Clark*

Martyn Clark and his collaborators in the Ensemble Streamflow Forecasting in Snowmelt-Dominated River Basins project evaluated potential hydrologic applications of medium-range Numerical Weather Prediction (NWP) model output, implemented and tested a heuristic ensemble re-ordering method developed by John Schaake at the NWS Office of Hydrologic Development, developed generic methods to condition streamflow forecasts on probabilistic climate forecasts, and used station observations of Snow Water Equivalent (SWE) in an ensemble Kalman filtering scheme for snow updating.



- **Hydro-climate Research and Decision Making (Clark, Gangopadhyay)**



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 hydrologic 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.
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 Colorado Basin River Forecast Center to compare its experimental streamflow forecasting procedures with the current operational procedures, and is also working with the NWS Office of Hydrologic Development to infuse its experimental forecasting techniques in the NWS Advanced Hydrologic Prediction Services. Most of the work has focused on developing local-scale forecasts of model forcings (e.g., precipitation and temperature), for forecast lead times from days to seasons. These methods have resulted in tangible increases in forecast skill, in both experimental and operational applications. Other, more embryonic, 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.

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

Strategic Plan Themes: evaluating relationships, developing tools

- **New Directions in the Earth Sciences and Humanities (Frodeman)**



Today's environmental challenges are as much value-driven as they are scientific and technological in nature. Whether the question is global climate change or a local project of ecological restoration, ethical, political, aesthetic, and religious values are tied to the insights of science and engineering. Society needs a sustained cultural conversation across academia, and between academia and the public and private sectors, that bridges these domains and interests. New Directions seeks to develop the theory and practice of wide interdisciplinarity—integrating the public and values-dimensions of our environmental challenges with on-going scientific research and education. This year it held a workshop in St. Petersburg, Russia, “Cities and Rivers: Interdisciplinary and International Perspectives,” as well as a conference at Penn State, “New Directions in Interdisciplinary Research: A Conference in Real World Experiments.”

Website: <http://newdirections.colorado.edu>

Strategic Plan Themes: evaluating relationships, providing alternatives

- **“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.

Strategic Plan Theme: evaluating relationships

- **Science Policy Assessment and Research on Climate (SPARC) (Pielke)**

The overarching focus of SPARC will be 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. This 5-year project will commence in 2005.

Strategic Plan Themes: evaluating relationships, providing alternatives, developing tools

- **Understanding and Enhancing the Linkages between Decision Making and Carbon Cycle Research** (Pielke)

This project is a collaborative activity of Arizona State University's Consortium for Science, Policy and Outcomes, the Center for Science and Technology Policy Research at the University of Colorado/Cooperative Institute for Research in the Environmental Sciences (CIRES), and the Natural Resources Ecology Laboratory at Colorado State University. This project 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. Its work has focused on understanding supply and demand in three cases: U.S. agriculture, the U.S. urban environment, and carbon cycle science in Brazil. The project will culminate with a workshop to be held in September 2004 at the Natural Resources Ecology Laboratory in Fort Collins, CO.



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

Strategic Plan Theme: evaluating relationships

- **Western Water Assessment** (Clark)

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 also supports two graduate students.



Website: <http://sciencepolicy.colorado.edu/wwa/>

Strategic Plan Themes: evaluating relationships, providing alternatives, developing tools

Staff Highlight *Robert Frodeman*

In 2003 Robert Frodeman published *Geo-Logic: Breaking Ground between Philosophy and the Earth Sciences* (SUNY). He also organized a meeting of the organization he leads, New Directions in the Earth Sciences and the Humanities, at Penn State in October. Frodeman received \$150,000 in funding from NASA in support of New Directions. Finally, Frodeman ran a summer workshop for local teachers within the Boulder Valley School District on integrating ethics and values with science education.



Education

In 2003-04 the Center began implementation of its new **Graduate Certificate Program in Science and Technology Policy** with ten students in its first cohort.



Graduate Certificate In Science and Technology Policy

These students come from the physical sciences, social science, humanities, and engineering. 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.

Strategic Plan Theme: developing tools

Other Center educational activities include:

- **CU-RAA-NCAR Joint Internship (Pielke)**



Reinsurers insure insurance companies for catastrophe losses and therefore provide the largest share of the financing for recovery from major natural catastrophes. Much of their financial analysis is based on current scientific understanding about catastrophe risk. During the summer of 2003 four students in policy or scientific graduate programs from around the country were placed with reinsurance companies to increase the students' awareness of the reinsurance industry and to expose the industry to the perspectives of highly skilled students in policy and the sciences.

Strategic Plan Theme: providing alternatives

- **Flatirons Outdoor Classroom Summer Workshop (Frodeman)**

The Flatirons Outdoor Classroom is a K-12 curricular project involving the Boulder Valley School District, the Denver Museum of Nature and Science, and the University of Colorado. The Project consists of an interdisciplinary outdoor learning environment that combines elements of science, art, social studies, and the humanities, and a forthcoming suite of curricular materials designed to make effective use of the classroom. In the summer of 2003, Bob Frodeman received funding from the NSF to run a teacher training workshop on developing new ways to integrate ethics and values with science education. The workshop has resulted in the development of a number of new lesson plans, soon to be posted on the web.



Flatirons Elementary Outdoor Classroom Project

Strategic Plan Theme: developing tools.

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.

- **Adam Briggie** (Ph.D. candidate, Environmental Studies) – humanities policy
- **Joel Gratz** (joint M.B.A./M.S. student, Environmental Studies) – weather policy
- **Yeonsang Hwang** (Ph.D. candidate, Civil Engineering) – water resources, Western Water Assessment
- **Jessica Lang Lowrey** (M.S. Environmental Studies 2004) – evaluation of science policy assessments
- **Genevieve Maricle** (Ph.D. candidate, Environmental Studies) - climate services, technology transfer
- **Elizabeth McNie** (Ph.D. candidate, Environmental Studies) – science policy, environmental policy
- **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

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

- [Jessac Baird](#) – assistant to webmaster
- [Jonathan Holen](#) – office assistance

COURSES TAUGHT BY CENTER STAFF

- **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 an issue of environmental policy.

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

This course introduced students to science and technology policy research and set 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.

- **Introduction to the Decision Process** (Roger Pielke, Jr.)

This course was designed to teach a systematic framework for analyzing processes of decision making. Its goals were to introduce students to conceptual tools which may be useful in thinking more effectively and responsibly about any problem or decision; and to develop and practice skills using the tools to analyze the various dimensions of a decision process for the purpose of making recommendations about how to realize a set of preferred outcomes in practical settings.

- **Hydroclimatology** (Martyn Clark co-taught with Balaji Rajagopalan)

The objectives of this course were to obtain an understanding and appreciation of hydrology as a quantitative science describing the occurrence, distribution and movement of water at and near the surface of the earth; to develop a sound intuitive and quantitative understanding of the physical processes involved in the land phase of the hydrologic cycle; to learn how to use this knowledge to address engineering problems related to water resources; and to provide exposure to current research issues regarding spatial and temporal scales of the hydrologic processes.

- **Humanities Policy** (Bob Frodeman)

The developing field of "humanities policy" seeks to integrate the humanities into policy research and decision making. This course explored three aspects of this field: 1) a critique of the established and often unreflective philosophical presumptions of current approaches to policy science/studies/analysis, 2) the possibility that our problems are significantly humanistic rather than scientific in nature, and 3) means for evaluating the effectiveness of the humanities, both ante and post facto.

- **The Use, Misuse, and Abuse of Science in Policy and Politics** (Roger Pielke, Jr.)

The goal of this course was to motivate students to think critically about the role of science in policy and politics. Students in this course were expected to gain a greater awareness of the assumptions that underlie thinking about science in policy and politics. Students were expected to critically engage those assumptions through a case study on the misuse of science in the administrations of George H. W. Bush and William J. Clinton.

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 new weblog (Prometheus), and extensive media coverage.

2003-04 PUBLICATIONS

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/>.

- Anderson-Berry, L., T. Keenan, J. Bally, R. A. Pielke, Jr., R. Leigh, and D. King, 2004. The Societal, Social, and Economic Impacts of the World Weather Research Programme Sydney 2000 Forecast Demonstration Project (WWRP S2000 FDP), *Weather and Forecasting*, Volume 19, pp. 168-178.
- Byerly, R., R.B. Leshner and P.L. Whitney, Rapporteurs, 2004. Issues and Opportunities Regarding the U.S. Space Program. Report of a Workshop, Space Studies Board, National Research Council, National Academies Press, Washington, DC.
- Clark, M.P., S. Gangopadhyay, D. Brandon, K. Werner, L. Hay, B. Rajagopalan, and D. Yates, 2004. A resampling procedure to generate conditioned daily weather sequences. *Water Resources Research*, 40 (4) W04304, doi: 10.1029/2003WR002747.
- Clark, M.P., S. Gangopadhyay, L.E. Hay, B. Rajagopalan, and R.L. Wilby, 2004. The Schaake Shuffle: A Method for Reconstructing Space-Time Variability in Forecasted Precipitation and Temperature Fields. *Journal of Hydrometeorology*, Vol. 5, 243-262.
- Clark, M.P. and L.E. Hay, 2004. Use of Medium-Range Numerical Weather Prediction Model Output to Produce Forecasts of Streamflow. *Journal of Hydrometeorology*, Vol. 5, No. 1, 15-32.
- Frodeman, R., 2003. *Geo-Logic*: State University of New York Press, March, 192pp.
- Frodeman, R., 2003. Initiative Bridges Gap Among Humanities, Science, and Society. *EOS*, Vol. 84, no. 16, p. 146.
- Frodeman, R., Mitcham, C. and R. Pielke, Jr., 2003. Humanities for Policy - and a Policy for the Humanities. *Issues in Science and Technology*, Fall, pp. 29-32.
- Hay, L.E. and M.P. Clark, 2003. Use of statistically and dynamically downscaled atmospheric model output for hydrologic simulations in three mountainous basins in the western United States. *Journal of Hydrology*, V. 282, pp. 56-75.
- Kenney, D., R. Klein, and M. Clark, 2004. Use and Effectiveness of Municipal Water Restrictions During Drought in Colorado. *Journal of the American Water Resources Association*, February, 77-87.
- Klein, R., 2003. Someone to Blame: Legal Liability for Weather Forecasts. *Weatherwise Magazine*, September/October.
- Pielke, Jr., R.A., 2004. L'Apocalisse Prossima Ventura (Italian Version). *Darwin*, May, 52-59. (Also available in English.)
- Pielke, Jr., R.A., 2003. The Great American Weather War. *Natural Hazards Observer*, July, pp. 1-3.
- Pielke, Jr., R.A., 2003. Pre-emptive politics ignores science. *Rocky Mountain News*, 18 August.
- Pielke, Jr., R.A., 2003. The role of models in prediction for decision. Chapter 7: *Understanding Ecosystems: The Role of Quantitative Models in Observations, Synthesis, and Prediction*.
- Pielke, Jr., R.A. (ed.), 2004. Report on the Misuse of Science in the Administrations of George H.W. Bush (1989-1993) and William J. Clinton (1993-2001). By the Students in ENV5 4800, Maymester 2004, University of Colorado, June.

- **Pielke, Jr., R.A.**, 2003. In *Science*, Vol. 301, No. 5639: 1483-1484, Which Future for Humanity? A book review of *Our Final Hour, A Scientist's Warning: How Terror, Error, and Environmental Disaster Threaten Humankind's Future in This Century-On Earth and Beyond*, by Martin Rees, Basic Books (Perseus), 2003, 238 pp.
- **R. Pielke Jr.**, J. Abraham, E. Abrams, J. Brock, R. Carbone, D. Chang, K. Droegemeier, K. Emanuel, E.W. Friday, Jr., R. Gall, J. Gaynor, R.R. Getz, T. Glickman, B. Hoggatt, W.H. Hooke, E.R. Johnson, E. Kalnay, J. Kimpel, P. Kocin, B. Marler, R. Morss, R. Nathan, S. Nelson, R. Pielke Sr., M. Pirone, E. Prater, W. Qualley, K. Simmons, M. Smith, J. Thomson, and G. Wilson, 2003. Report of the U.S. Weather Research Program Workshop on The Weather Research Needs of the Private Sector, *Bulletin of the American Meteorological Society*, July, ES53-ES67.
- **Pielke, Jr., R.A.** and R. T. Conant, 2003. Best practices in prediction for decision making: lessons from the atmospheric and Earth sciences, *Ecology*, 84:1351-1358.
- Stewart, T. S., **R. A. Pielke, Jr.**, and R. Nath, 2004. Understanding User Decision Making and the Value of Improved Precipitation Forecasts: Lessons from a Case Study. *Bulletin of the American Meteorological Society*, Vol. 85, No. 2, pp. 223-235.
- **Pielke, Jr., R.A.**, J. Rubiera, C. Landsea, M. Fernandez, and **R.A. Klein**, 2003. Hurricane Vulnerability in Latin America and the Caribbean. *Natural Hazards Review*, 4:101-114.
- Sarewitz, D., **R.A. Pielke, Jr.**, and M. Keykyah, 2003. Vulnerability and Risk: Some Thoughts From A Political and Policy Perspective. *Risk Analysis*, 23:805-810.

Staff Highlight *Subhrendu Gangopadhyay*

The model developed by Subhrendu Gangopadhyay and Martyn Clark for improving operational streamflow forecasting was transferred to the Colorado Basin River Forecast Center in December 2003. This research also resulted in four peer-reviewed publications.



TALKS AND PRESENTATIONS

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/center_info/center_talks.html) contains a list of all talks given at or sponsored by the Center. When available, presentations and other materials are posted on the Speakers page.

Staff Presentations outside the Center

- **Gangopadhyay, S., M.P. Clark**, B. Rajagopalan, K. Werner, and D. Brandon, 2004. Effects of spatial and temporal aggregation on the accuracy of downscaled precipitation estimates in the Upper Colorado River Basin, AMS, 18th Conference on Hydrology, Seattle, Washington.
- **Pielke, Jr., R.A.**, 2004. Scoops: Five Climate Change Stories Yet to be Told, Scripps Institute on the Environment, Center for Environmental Journalism, University of Colorado, Boulder, CO, 14 May.
- **Pielke, Jr., R.A.**, 2004. Design and Implementation of a Research Program Focused on the Societal Aspects of Weather, Workshop on Societal Impacts Research in MEDEX, Barcelona, Spain, 23 February.
- **Pielke, Jr., R.A.**, 2004. Climate Science and Policy. University of Colorado School of Health Sciences, Denver CO, 18 February.

- **Pielke, Jr., R.A.**, 2003. The Politics of Preemption. University of Colorado Graduate School Fall Symposium, 8 October.
- **Pielke, Jr., R.A.**, 2003. Scientists in Policy and Politics: The Case of Climate Change. UMAC Distinguished Speaker, University of North Dakota, 11 September.
- **Pielke, Jr., R.A.**, 2003. Numbers Don't Lie but People Do, Conversations on Mathematics and the Environment, Mathematics Association of America Annual Meeting, Boulder, CO, 1 August.
- **Pielke, Jr., R.A.**, 2003. Plenary Theme Leader, Management of Natural Hazards, Coastal Zone 2003, Baltimore, MD, 16 July.
- **Pielke, Jr. R.A.**, 2003. Prediction, Uncertainty and Decisions, session on Predicting Disaster: Uncertainty, Forecasts and Behavior, Natural Hazards Annual Workshop, Boulder, CO 15 July.
- **Pielke, Jr. R.A.**, 2003. Vulnerability Management and Risk Management: Some Considerations from Policy and Political Perspectives, session on Political Issues Associated with Risk Trade-Off Decisions, Natural Hazards Annual Workshop, Boulder, CO 15 July.
- **Udall, B.** and Ray, A., 2004. Weather/Climate Conditions and Outlook, Colorado River Water Conservation District Annual State of the River Meeting, Frisco, CO, 11 May.

Student Presentations outside the Center

- **Jessica Lang Lowrey**, 2004. Western Water Assessment poster presentation. Rocky Mountain Regional Conference for the Colorado Lake and Reservoir Management Association, Denver, May 12-14.
- **Genevieve Maricle**, 2004. A Science and Technology Policy for the Atmospheric Sciences. AAAS Southwest and Rocky Mountain Region Annual Meeting, April 8.

Talks at or sponsored by the Center

- May 28, Wolfgang Krohn (University of Bielefeld, Germany), "Technology, Knowledge and Organization of Waste Management."
- May 24, Faculty Affiliate Phil Weiser (CU School of Law), "Standard Setting and the Digital Television Saga."
- May 10, Dr. Betsy Weatherhead (CIRES), "Detecting Trends in Environmental Data: Why is it so Difficult and What Does This Mean for Policy?"
- April 19, Faculty Affiliate Jerry Peterson (CU Physics), "Attribution Doctrines and Policies Following WMD Attacks."



Betsy Weatherhead



Kevin Vranes

- April 12, Kevin Vranes (AGU Congressional Science Fellow), roundtable discussion.
- April 6, Andrew Revkin (New York Times science reporter) visited with students enrolled in the Science and Technology Policy Certificate Program to discuss the media's role in covering science, policy, and politics.

- April 5, Dr. Robert Wilby (Climate Change Science Manager, Environment Agency), "Application of statistical downscaling to urban heat island and water resource estimation in southeast England"



Robert Wilby



Manuel Lujan

- March 29, Visiting Scholar Anne Ruggles, "How Science is Used and Misused in the Klamath Basin."
- March 16, Manuel Lujan (former Secretary of Interior) visited Roger Pielke's Decision Process class to discuss the role of science in decision making.
- March 1, Graduate Student Joel Gratz (CU ENV5), "Striking Back! Protecting Spectators from Lightning in Large Stadiums."

- February 16, Faculty Affiliate Tom Chase (CU Geography), "Utility of Downscaling Climate Model Information to Guide Mitigation Strategies."
- February 10, James Watt (former Secretary of Interior) visited Roger Pielke's Decision Process class to discuss the role of science in decision making.
- February 2, Michael Rodemeyer (Executive Director of the PEW Initiative on Food and Biotechnology), "Lessons from The Biotech Wars: Is Nanotechnology Next?"



James Watt



Maureen McCarthy

- January 26, Susi Moser (National Center for Atmospheric Research), "Confused and Scared and Deeply in Denial: Thinking Out Loud About How to Improve Climate Change Communication and Facilitate Social Change"
- December 18, Dr. Maureen McCarthy (Director of Homeland Security's Office of R&D, and a CU-Boulder Ph.D. alumna), "From Chemical Physics to Directing Homeland Security: a CU-Boulder alumna's account of her education and career."
- December 15, Graduate Student Genevieve Maricle (CU ENVS), "Climate Services Clearinghouse."



Genevieve Maricle

- November 6, the Center hosted a public debate on current American foreign policy, including the recent preemptive invasion of Iraq by the United States. Participants included Professor Thomas Zeiler, chair of CU's history department, Professor Roger Pielke Jr., director of the Center for Science and Technology Policy Research, and two environmental sciences graduate students, Eduoard Von Herberstein and Elizabeth McNie. The debate was one of roughly 1,000 similar debates being held across the country to develop opinions on U.S. foreign policy as part of "The People Speak: America Debates its Role in the World." The debates were jointly funded by the United Nations Foundation, the Open Society Institute, and the Rockefeller Brothers Fund as part of their ongoing missions to support grassroots community involvement in foreign policy.



Paul Komor

- October 27, Graduate Student Jessica Lang Lowrey (CU ENVS), "What is an Assessment? Connections Between Science and Decision-making."
- September 29, Faculty Affiliate Paul Komor (CU Civil Engineering), "Life and Death of the Office of Technology Assessment (OTA)."

OGMIUS

The Center's newsletter, Ogmios, is published three 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. Ogmios also includes Center news and information of interest to the S&T policy field. Current and past issues of Ogmios are available online (http://sciencepolicy.colorado.edu/ogmios/archives/issue_8/index.html) and in pdf format. Ogmios 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

In 2004, the Center added Prometheus: The Science Policy Weblog (<http://sciencepolicy.colorado.edu/prometheus/>) to its outreach efforts. Prometheus hosts science policy news and commentary, and provides a place for public comment and discussion. The site provides a useful service to the science policy community. Readers are encouraged to visit and contribute to the site. In the first month of Prometheus's existence a posting by Roger Pielke, Jr. was reproduced in full in the Washington Times.

PROMETHEUS

WEBSITE

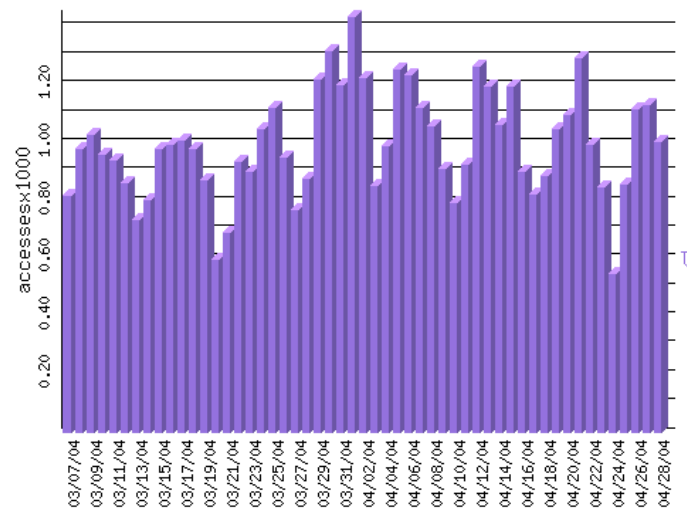
The Center makes extensive use of the Internet for its outreach activities. Each project listed above has its own unique web page. The following is a sample of additional pages on the site:

<i>Prometheus</i>	http://sciencepolicy.colorado.edu/prometheus/	The Center's new science policy weblog hosts science policy news and commentary, and provides a place for public comment and discussion.
<i>Speakers page</i>	http://sciencepolicy.colorado.edu/center_info/center_talks.html	Provides a list of all past and upcoming speakers, dates and titles of their talks, and presentations, if available.
<i>SPGrads</i>	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.
<i>Science & Technology Jobs</i>	http://sciencepolicy.colorado.edu/sp_grads/opportunities.html	This site contains links to pages with science and technology policy jobs, internships, fellowships, etc.
<i>Education</i>	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.
<i>Science and Technology Policy Web Resources</i>	http://sciencepolicy.colorado.edu/web_resources/index.html	This page provides links to S&T journals, publications, organizations, and centers around the country.
<i>Media Resources</i>	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.
<i>Ogmios</i>	http://sciencepolicy.colorado.edu/ogmios/archives/issue_8/index.html	The Center's newsletter, Ogmios, is published three times annually, and is available on the Center's website as well as by subscription. This page includes current and previous editions of Ogmios.
<i>Extreme Weather Sourcebook 2001</i>	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. We are in the process of updating the Sourcebook.

WEBSITE VISITS

During the sample period March 7 through April 28, 2004, the Center's website received an average of approximately 1,000 unique visitors per day and a maximum of over 1,400. While not reflected in this graph the website has received as many as 3,000 unique visitors a day when the Center's newsletter was issued. Website traffic has grown substantially from roughly the same time period in 2002 when we received an average of 325 unique visitors per day. With the addition of sites like the Climate Services Clearinghouse database and the Prometheus weblog, we expect our base of visitors to expand and diversify.

Unique Visitors by IP Address History from 3/7/2004 to 4/29/2004



MEDIA COVERAGE

The Center continues to attract significant attention from the media, with the following references to Center personnel in 2003-2004:

- Roger Pielke, Jr. was quoted in a June 28, 2004 Greenwire news story on public opinion and climate change.
- Roger Pielke, Jr. was quoted in the June 22, 2004 issue of the Colorado Daily on the suborbital private-sector space launch.
- A 2002 essay in Nature by Roger Pielke, Jr. was referenced in a June 10, 2004 column in The Weekly Standard.
- Roger Pielke, Jr. was quoted May 21, 2004 by MSNBC on Russia's apparent commitment to the Kyoto Protocol.
- Roger Pielke, Jr. was quoted in a May 19, 2004 Greenwire article on the political impact of new global warming movie, "The Day After Tomorrow."
- A May 17, 2004 posting by Roger Pielke, Jr. to the Center's weblog Prometheus was reprinted in full in John McCaslin's Inside the Beltway column under the title, "Beats fiction", The Washington Times, May 18, 2004, p. A5
- The Rocky Mountain News reports on May 7, 2004 that Center Visiting Scholar Anne Ruggles is one of 21 people recently selected to serve on a working group to design a plan for managing wolves that may come into the state.
- Roger Pielke, Jr. was quoted in the April 27, 2004 Rocky Mountain News in an article on science in policy and politics.
- Roger Pielke, Jr. was quoted in the April 5, 2004 Greenwire about the upcoming movie on climate

Staff Highlight

Bobbie Klein

Bobbie continued her study of the municipal response to drought in Colorado's Front Range. A paper summarizing the results of her 2002 study (with Doug Kenney and Martyn Clark) appeared in the February 2004 edition of the Journal of the American Water Resources Association. She is currently analyzing municipal drought response plans in the Front Range.



change, "The Day After Tomorrow."

- Roger Pielke, Jr. was quoted in the April 2, 2004 issue of the Financial Times in an article on the politicization of climate science.
- Martyn Clark was quoted in a February 20, 2004 article that appeared in Science Magazine, "As the West Goes Dry," by Robert F. Service.
- Roger Pielke, Jr. was quoted in the January 17, 2004 issue of The Economist in a story on President Bush's proposal for human missions to the moon and Mars.
- Roger Pielke, Jr. was quoted in The New York Times in an article about a speech on global warming given by former Vice President Al Gore.
- Center Visiting Scholar Rad Byerly was quoted in a January 15, 2004 article in the San Francisco Chronicle, "President shoots for moon, Mars Lunar Foothold: Scientists disagree on value of U.S. return to Earth's satellite" by Carl T. Hall.
- Roger Pielke, Jr. was quoted in the January 5, 2004 Greenwire on The Weather Channel's coverage of climate change.
- Roger Pielke, Jr. was quoted in the November 12, 2003 issue of Kristeligt Dagblad, a Danish newspaper, on science and politics in the Bush Administration.
- Roger Pielke, Jr. discussed the new Science and Technology Policy Certificate Program in the October 27, 2003 Denver Business Journal.
- Graduate student Erik Noble and Roger Pielke, Jr. discussed the new Science and Technology Policy Certificate Program in the October 18, 2003 Boulder Daily Camera.
- Roger Pielke, Jr. was quoted in a feature article about the politicization of science in the Naples News on October 10, 2003.
- Roger Pielke, Jr. was quoted in an October 5, 2003 essay in the Boston Globe on the politics of science and the gap left by the 1995 termination of the Office of Technology Assessment.
- Roger Pielke, Jr. was quoted September 26, 2003 in a Discovery Channel news story on the economics of disasters following Hurricane Isabel.
- Roger Pielke, Jr. was quoted in a September 24, 2003 Scripps-Howard News Service story on the aftermath of Hurricane Isabel.
- Roger Pielke, Jr. was quoted in the Christian Science Monitor in a story on the aftermath of Hurricane Isabel's landfall on the east coast of the United States.
- Roger Pielke, Jr. was quoted in a September 11, 2003 Daily Camera article on academia and homeland security.
- Roger Pielke, Jr. was quoted in the August 27, 2003 Economist on the future of the space shuttle program.
- Rad Byerly was interviewed by NPR on the future of the U.S. Space Program.
- Roger Pielke, Jr. was quoted in a August 13, 2003 Scientist article titled "Science, Policy and Partisan Politics."
- Roger Pielke, Jr. was quoted in the August 5, 2003 New York Times in a story titled, "Politics Reasserts Itself in the Debate over Climate Change and its Hazards."
- Roger Pielke, Jr. was quoted in the August 2003 issue of Scientific American on the debate over a recent paper on global warming, "Hot Words - A claim of nonhuman-induced global warming sparks debate," by David Appell .

People

CENTER STAFF

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. Martyn leads the CIRES-NOAA Western Water Assessment program.

Robert Frodeman joined the Center in January 2003 as a Research Scientist. Bob specializes in environmental philosophy, the philosophy of technology, and the philosophy of science policy. He has a B.A. in history, an M.S. in the Earth sciences, and a Ph.D. in philosophy from Penn State. He has held positions at the University of Texas and the University of Tennessee, and has consulted for the U.S. Geological Survey for the last nine years. In 2001-2002 Bob was the Hennebach Professor of the Humanities at the Colorado School of Mines.

Subhrendu Gangopadhyay is a Research Associate in Hydroclimatology who has been working with Martyn Clark on improving the skill of streamflow forecasts and developing partnerships between the research and operational communities to facilitate the transfer of knowledge and tools from the research community to the operational setting. Subhrendu received a Doctor of Engineering, D.Eng. (Civil Engineering - Water Resources Engineering) from the Asian Institute of Technology, Bangkok, Thailand, in 1997.

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.

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 Office Manager. Ami received her B.A. in Psychology from the University of Colorado.

Roger Pielke is the Center's Director. Roger joined the faculty of the University of Colorado in July 2001 where he is an Associate 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, an M.A. in public policy, and a Ph.D. in political science, all 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.

VISITING SCHOLARS

Rad Byerly is a Visiting Scholar at the Center, working on science and technology policy issues. Rad is a former Chief of Staff for the House Science Committee.

Lauren McCain is a Visiting Scholar with the Center. Lauren obtained her Ph.D. in Political Science in 2003. Lauren's research focuses on how policy decisions influence large-scale scientific and technological projects such as the Human Genome Project. She also studies the influence of scientific knowledge on other types of decision-making, particularly wildlife management policy.

Anne Ruggles is a Visiting Scholar with the Center. Anne has B.S. degrees in Zoology and Anthropology from the University of Texas at Austin and an M.S. in Wildlife Biology from the University of Alaska Fairbanks. She received her J.D. from the University of Colorado School of Law with an emphasis in natural resources law in 2003. Her work in wildlife management and policy combines elements of biology, law, and politics. Anne was recently appointed to the State of Colorado's wolf management committee.

AFFILIATES

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

- Susan Avery, Director, CIRES
- Tom Chase, Assistant Professor of Geography, University of Colorado
- Roger Kennedy, former Director, National Park Service
- Doug Kenney, Research Associate, Natural Resources Law Center, University of Colorado
- Paul Komor, Lecturer in the Dept. of Civil Engineering, Univ. 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, Dept. of Preventive Medicine and Biometrics, School of Medicine, Univ. of Colorado Health Sciences Center and the Environmental Studies Program, Univ. of Colo
- Jim Martin, Director of the Natural Resources Law Center, 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, Consortium 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

Mark Lohaus

Mark increased the visual appeal of the Center's current website, designed several new sites associated with the center or designed old sites, and wrote and improved several web applications designed to deliver interactive content. Mark gave the Center's homepage a new look and enhanced its usability and maintainability. He also improved an application that allows staff to add events, announcements, and publications to the homepage. Mark vastly expanded the publications application to handle a wide variety of resources. This application now not only drives the Center's Publications, but also the Climate Services Clearinghouse, the Space Policy Library, and the Humanities Policy Library.



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 2003-2004:

- J. Abraham, Meteorological Service of Canada
- E. Abrams, Accuweather, Pennsylvania State College
- R.B. Alley, Department of Geosciences and EMS Environment Institute, Pennsylvania State University
- L.T. Anderson-Berry, James Cook University Centre for Disaster Studies
- Vicky Arroyo, Pew Center on Global Change
- L.M. Avallone, NCER
- Susan Avery, CIRES
- R. Bally, Bureau of Meteorology Research, Melbourne, Victoria, Australia
- Andy Barrett, NSIDC / CIRES
- B. Bass, Atmospheric Environment Service
- Gary Bates, CDC
- J. Block, DTN Weather Services
- D. Brandon, Colorado Basin River Forecasting Center
- D.H. Bromwich, Byrd Polar Research Institute, Ohio State University
- R. Carbone, NCAR
- D. Chang, Atmospheric and Environmental Research
- Tom Chase, CU Geography
- M. Claussen, Institute of Physics, Potsdam University
- Richard Conant, Natural Resources Ecology Laboratory, CSU
- Greg Cronin, CIRES Center for Limnology
- Lisa Dilling, ESIG/NCAR
- Randall Dole, CDC
- M. Downton, ESIG, National Center for Atmospheric Research
- K. Drdla, NASA
- K. Droegemeier, University of Oklahoma
- K. Emanuel, Mass. Institute of Technology
- A.J. Etringer, CIRES
- M. Fernandez, World Economy Research Centre
- Bruce Foltz, Eckerd College
- E.W. Friday Jr., National Research Council
- Jose Fuentes, Atmospheric Sciences, University of Virginia
- R. Gall, National Center for Atmospheric Research
- J. Gaynor, NOAA / Maryland
- R.R. Getz, AWIS Weather Services, Inc.
- T. Glickman, Mass. Institute of Technology
- Chris Goemans, Institute of Behavioral Science (IBS)
- V. Gupta, CalTech
- L.E. Hay, USGS
- Charles Herrick, Stratus Consulting
- Martin Hoerling, CDC
- B. Hoggatt, Aquila Energy
- William Hooke, AMS
- Charles Howe, Institute of Behavioral Science (IBS)
- M.F. Hutchinson, Centre for Resource and Environmental Studies, Australian National University
- L.T. Iraci, NASA
- Shaleen Jain, CIRES / CDC
- E.R. Johnson, National Weather Service
- P. Kabat, DLO Winand Staring Centre, Netherlands
- E. Kalnay, Univ. of Maryland, College Park
- J. Keenan, Bureau of Meteorology Research, Melbourne, Victoria, Australia
- Douglas Kenney, CU Natural Resources Law Center
- Dan Kevles, Yale
- M. Keykyah
- J. Kimpel, NOAA/NSSL
- D. King, James Cook University Centre for Disaster Studies
- P. Kocin, The Weather Channel
- Paul Komor, CU Civil Engr
- Wolfgang Krohn, Bielefeld University (Germany)
- Frank Laird, DU
- R. Lammers, Weather Systems Analysis Group
- C. Landsea, NOAA

- R. Leigh, Risk Frontier, Macquarie University, Australia
- William Lewis, CIRES Center for Limnology
- M. Linnea, University of Virginia
- Manuel Lujan, Former Secretary of the Interior
- B. Marler, Pacific Gas & Electric
- J. Marotzke, Southampton Oceanography Centre, UK
- Karena McKinney, Amherst College
- J.Z.B. Miller
- Carl Mitcham, Colorado School of Mines
- Donald Mock, CDC
- R. Morss, ESIG/NCAR
- Susi Moser, ESIG/NCAR
- M. Murphy, CIRES Center for Limnology
- R. Nath, Center for Policy Research
- R. Nathan, Aquila Energy
- S. Nelson, National Science Foundation
- Claudia Nierenberg, NOAA/OAR
- W.D. Nordhaus, Department of Economics, Yale
- Gunilla Oberg, Linköping Universitet (Sweden)
- Naomi Oreskes, UCSD
- D. Peteet, Lamont Doherty Earth Observatory, Columbia University
- G. Petschel-Held, Potsdam Institute for Climate Impact Research
- R.T. Pierrehumbert, Department of the Geophysical Sciences, Chicago
- M. Pirone, WSI Corp
- John Pitlick, Dept of Geography
- E. Prater, Innovative Energy Management
- W. Qualley, American Airlines
- Balaji Rajagopalan, Dept. of Civil, Environmental and Architectural Engineering
- Andrea Ray, CDC
- S. Regonda, CU Center for Advanced Decision Support for Water and Environmental Systems
- Andy Revkin, New York Times science reporter
- P.B. Rhines, Department of Atmospheric Sciences & Oceanography, University of Washington
- John Robinson, University of British Columbia
- Michael Rodemeyer, PEW Initiative on Food and Biotechnology
- Lee Rozaklis, Hydrosphere, Inc.
- Jose Rubiera, Cuban Meteorological Service
- Anne Ruggles, wildlife biologist/attorney, Center Visiting Scholar
- Dan Sarewitz, CSPO/ASU
- James Saunders, CIRES Center for Limnology
- Mark Serreze, NSIDC / CIRES
- D. D. Shoji Ojima, Natural Resource Ecology Laboratory, Colorado State University
- K. Simmons, Oklahoma City University
- M. Smith, WeatherData, Inc.
- Paul Sperry, CIRES
- T.S. Stewart, Rockefeller College of Public Affairs, State Univ. of New York
- T.F. Stocker, Physics Institute, Bern, Switzerland
- T. Stohlgren, Colorado State University
- K. Strzepak, International Institute for Applied Systems Analysis
- L.D. Talley, The Scripps Institute of Oceanography, University of San Diego
- J. Thomson, WeatherNews, Inc.
- M.A. Tolbert, California Institute of Technology
- Darin Toohey, CU
- Will Toor, CU, Mayor City of Boulder
- Kevin Vranes, AGU Congressional Science Fellow
- J.M. Wallace, Department of Atmospheric Sciences & Oceanography, University of Washington
- Robert S. Webb, NGDC and CDC
- K. Werner, Colorado Basin River Forecast Center
- John Wiener, Institute of Behavioral Science (IBS)
- R.L. Wilby, Environment Agency
- G. Wilson, Baron Services
- Klaus Wolter, CDC
- Connie Woodhouse, INSTAAR and NGDC
- D. Yates, NCAR
- T. Zhang, CIRES

BOARDS AND COMMITTEE MEMBERSHIPS

Rad Byerly

NRC Space Studies Board. The board conducts policy studies for the nation's space program. Recently Byerly took the lead, as rapporteur, in preparing the summary of a workshop on national space policy. The workshop reached conclusions consonant with the policy subsequently announced by the President.

The Board of Directors of the Associated Universities for Research in Astronomy (AURA). AURA is a consortium of universities, and its essential role is to develop and operate astronomical facilities too large for most universities to undertake alone. AURA also manages the science operations of the Hubble Space Telescope for NASA.

The Committee on Science, Engineering, and Public Policy of the American Association for the Advancement of Science.

Roger Pielke, Jr.

Editorial Board Membership

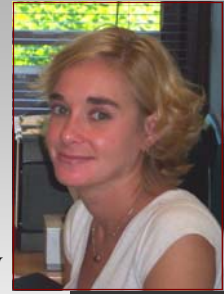
- 2004- Member, Editorial Board, *Darwin*
- 2003- Member, Editorial Board, International Encyclopedia of Science, Technology and Ethics
- 2001- Member, Editorial Board, *Bulletin of the America Meteorological Society*
- 2001- Member, Editorial Board, *Policy Sciences*
- 2001- Associate Editor, *Natural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

National and International Committee Service

- 2004- Chair, Advisory Group on Societal Impacts, World Weather Research Programme, World Meteorological Organization
- 2003- Advisory Panel, Program on Societal Dimensions of Engineering, Science and Technology, National Science Foundation
- 2003- Member, Advisory Committee, Pacific ENSO Applications Center
- 1998- Member, Science Steering Committee, World Weather Research Programme, World Meteorological Organization
- 2001- Member, Board of Directors, WeatherData, Inc.

Staff Highlight *Ami Nacu-Schmidt*

Ami Nacu-Schmidt, the Center's Office Manager, has continued to oversee the daily functioning of the Center, and any student researcher logistics. In addition to managing the daily functions, Ami also managed the coordination of submittal for the Center's NSF proposal, Science Policy Assessment and Research on Climate.



Appendices

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.

Staff Highlight

Roger Pielke, Jr.

In 2003-2004 Roger A. Pielke, Jr., along with Dan Sarewitz of ASU's CSPO, led a team of researchers in the development of a proposal titled Science Policy Assessment and Research on Climate (SPARC) which was submitted to the National Science Foundation. After a set of peer reviews, an onsite visit from NSF, and a project revision, SPARC received a multi-million dollar award. From 2005-2009, SPARC will focus on "climate science policy" with a goal of helping the science community to better understand and evaluate options for comprising climate science portfolios in ways likely to support the needs of climate science decision makers.



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 *Ogmios* 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.

Staff Highlight *Brad Udall*

Brad continues to wear numerous hats as day-to-day manager of the Western Water



Assessment. Project management, budgeting, governmental relations, public outreach, administrative and team meetings, website content, and strategic planning are all part of his normal workload. Brad designed and implemented a strategic planning effort resulting in a new mission statement, and, more importantly, a new guideline-driven process for selecting and funding projects. Other notable activities included revamping the WWA website and expanding existing relationships with Denver Water, Colorado River Water Conservancy District, City of Boulder, and Northern Colorado Water Conservancy District. Finally, as a member of the National Integrated Drought Information System CORE Team, Brad helped to draft and refine the NIDIS design document recently released by the Western Governors' Association.

- **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, 2003-2004

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	12/04
Western Water Assessment	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	2/05
One-Way and Two-Way Coupling of Atmospheric and Hydrologic Models	NOAA	\$120,000	9/01	8/04
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	\$125,000	2003	2008
Improving Operational Streamflow Forecasts in the Colorado River Basin	NWS	\$280,000	6/04	5/07
Development of Improved Hydrologic Forecasting Capabilities Using Space-based Observations	NASA	\$507,880	10/03	9/06
Robustness of policy options available to adapt to climate extremes in the Colorado River Basin	NOAA	\$295,411	1/04	12/06
Translation of seasonal climate forecasts and decadal variability into skilful hydroclimate predictions: Applications to resource management and decision making in the Rio de la Plata Basin, Argentina	NOAA	\$382,872	1/04	12/07
Learning Lessons from the NSF IGERT Program	NSF	\$217,805	2005	2007
CTS – Nanoscale: Science and Engineering Center	NSF	\$19,612,000	9/04	8/09
Digital Library	NSF	\$780,000	2004	2007
Societal Impacts Research Programs as Agents of Change	NSF	\$633,000	2004	2008



CENTER FOR SCIENCE AND TECHNOLOGY POLICY RESEARCH

CIRES/University of Colorado
1333 Grandview Avenue, UCB 488
Boulder, CO 80309-0488

Phone: 303-735-0451
Fax: 303-735-1576

<http://sciencepolicy.colorado.edu>